OPERATING AND SERVICE MANUAL

MODEL 1740A
OSCILLOSCOPE

HEWLETT-PACKARD COMPANY/COLORADO SPRINGS DIVISION
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SAFETY SUMMARY

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. Hewlett-Packard Company assumes no liability for the customer's failure to comply with these requirements.

GROUND THE INSTRUMENT.

To minimize shock hazard, the instrument chassis and cabinet must be connected to an electrical ground. The instrument is equipped with a three-conductor ac power cable. The power cable must either be plugged into an approved three-contact electrical outlet or used with a three-contact to two-contact adapter with the grounding wire (green) firmly connected to an electrical ground (safety ground) at the power outlet. The power jack and mating plug of the power cable meet International Electrotechnical Commission (IEC) safety standards.

DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE.

Do not operate the instrument in the presence of flammable gases or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.

KEEP AWAY FROM LIVE CIRCUITS.

Operating personnel must not remove instrument covers. Component replacement and internal adjustments must be made by qualified maintenance personnel. Do not replace components with power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable removed. To avoid injuries, always disconnect power and discharge circuits before touching them.

DO NOT SERVICE OR ADJUST ALONE.

Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

USE CAUTION WHEN EXPOSING OR HANDLING THE CRT.

Breakage of the Cathode-ray Tube (CRT) causes a high-velocity scattering of glass fragments (implosion). To prevent CRT implosion, avoid rough handling or jarring of the instrument. Handling of the CRT shall be done only by qualified maintenance personnel using approved safety mask and gloves.

DO NOT SUBSTITUTE PARTS OR MODIFY INSTRUMENT.

Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification to the instrument. Return the instrument to a Hewlett-Packard Sales and Service Office for service and repair to ensure that safety features are maintained.

DANGEROUS PROCEDURE WARNINGS.

Warnings, such as the example below, precede potentially dangerous procedures throughout this manual. Instructions contained in the warnings must be followed.

WARNING

Dangerous voltages, capable of causing death, are present in this instrument. Use extreme caution when handling, testing, and adjusting.

TABLE OF CONTENTS

Section Page

I GENERAL INFORMATION 1-1

1-1. Introduction 1-1
1-5. Specifications 1-1
1-8. Accessories Supplied 1-1
1-10. Accessories Available 1-1
1-12. Options 1-1
1-14. Instrument and Manual Identification 1-1

II INSTALLATION 2-1

2-1. Introduction 2-1
2-3. Initial Inspection 2-1
2-5. Power Cords and Receptacles 2-1
2-7. Power Requirements 2-1
2-10. Repacking for Shipment 2-1

III OPERATION 3-1

3-1. Introduction 3-1
3-3. Turn-on Procedure 3-1
3-5. Operator Checks 3-1
3-12. Trigger Selection Table 3-2
3-13. Obtaining Basic Displays 3-2
3-15. Normal Sweep Display 3-2
3-16. Magnified Sweep Display 3-3
3-17. Delayed Sweep Display 3-3
3-18. Mixed Sweep Display 3-3
3-19. X-Y Display 3-4
3-20. Single Sweep Operation 3-4
3-23. Single Sweep Using Trigger View 3-4

IV PRINCIPLES OF OPERATION 4-1

4-1. Introduction 4-1
4-3. Vertical Section Block Diagram 4-1
4-4. Input Attenuators 4-1
4-5. Vertical Preamplifier 4-1
4-6. Delay Line 4-1
4-7. Vertical Output Amplifier 4-1
4-8. Horizontal Section Block Diagram 4-1
4-9. Trigger Circuit 4-1
4-11. Sweep and Integrator Circuit 4-1
4-13. Holdoff Circuit 4-1
4-14. Horizontal Preamplifier 4-1
4-15. Horizontal Output 4-1
4-16. Gate Circuitry 4-1
4-18. High-voltage Power Supply 4-2
4-22. Low-voltage Power Supply 4-2
4-25. Circuit Details 4-2
4-27. Attenuator Assemblies 4-2
4-28. General Information 4-2
4-29. Input 4-2
4-30. Attenuator Stages 4-2
4-31. Vertical Section 4-2
4-32. General Information 4-2

Section Page
4-33. Preamplifier Stage 4-2
4-41. Preamplifier Controls 4-4
4-53. Delay Line Assembly 4-5
4-54. Vertical Output Amplifier 4-5
4-56. Horizontal Section 4-5
4-57. Main Trigger Circuitry 4-5
4-64. Main Sweep and Integrator 4-6
4-69. Delayed Trigger Operation 4-7
4-70. Delayed Sweep 4-7
4-71. Horizontal Display Switch Assembly 4-7
4-76. Horizontal Preamplifier 4-7
4-79. Horizontal Output 4-8
4-80. Gate Amplifier Assembly 4-8
4-88. High-voltage Power Supply 4-8
4-96. Low-voltage Power Supply 4-9
4-98. ±15-volt Supplies 4-9
4-101. +5-volt Supply 4-9
4-102. +120-volt and +43-volt Power Supplies 4-9
4-105. Floodgun Filament Voltage 4-10
4-106. Line Frequency 4-10
4-107. Option 101 4-10

V PERFORMANCE TESTS AND ADJUSTMENTS 5-1

5-1. Introduction 5-1
5-3. Recommended Test Equipment 5-1
5-5. Test Record 5-1
5-7. Performance Tests 5-1
5-9. Initial Control Settings 5-1
5-11. Performance Test Procedures 5-1
5-12. Bandwidth 5-1
5-15. Common Mode Rejection Ratio 5-3
5-17. Triggering 5-4
5-22. Sweep Time Accuracy 5-5
5-24. Differential Time Accuracy 5-6
5-26. Delay Jitter 5-6
5-28. Rise Time 5-7
5-30. Z-axis Blanking 5-7
5-32. Deflection Factor 5-7
5-34. Calibrator 5-8
5-36. Adjustments 5-8
5-40. Low-voltage Power Supply Adjustment 5-8
5-41. Intensity Limit Adjustment 5-9
5-42. Astigmatism and Focus Adjustment 5-9
5-43. Gate Response Adjustment 5-9
5-44. Floodgun Grid Adjustment 5-9
5-45. Trace Align and Y-axis Align Adjustments 5-9
5-46. Trace Align and Y-axis Align Adjustments - OPTION 101 5-9
5-47. Calibrator Amplitude Adjustment 5-9
5-48. Trigger Sensitivity Adjustment 5-10
5-49. Sync Zero Adjustment 5-10

TABLE OF CONTENTS (Cont'd)

Section Page
5-50. Trigger View Balance Adjustment 5-10
5-51. Delay Start Adjustment 5-11
5-52. Horizontal Amplifier Gain Adjustments 5-11
5-53. X10 Amplifier Balance Adjustment 5-11
5-54. Horizontal Linearity Adjustment 5-11
5-55. Preliminary Main Sweep Calibration 5-12
5-56. Delayed Sweep Adjustment 5-12
5-57. Main Sweep Fine Adjustment 5-12
5-58. Vertical Amplifier Balance Adjustment 5-13
5-59. Position and Sync Balance Adjustment 5-13
5-60. Input Capacitance and Attenuator Compensation Adjustments 5-14
5-61. Vertical Gain Adjustment 5-14
5-62. Pulse Response Adjustment 5-14
5-63. X-Y Gain Adjustment 5-15

VI REPLACEABLE PARTS 6-1
6-1. Introduction 6-1
6-3. Ordering Information 6-1

VII MANUAL CHANGES 7-1

7-1. Introduction 7-1
7-3. Manual Changes 7-1

VIII SCHEMATICS AND TROUBLESHOOTING 8-1

8-1. Introduction 8-1
8-3. Preventive Maintenance 8-1
8-4. Cleaning 8-1
8-6. Switch Maintenance 8-1
8-12. Removal and Replacement 8-2

Section Page
8-14. CRT Removal and Replacement . 8-2
8-15. HV Power Supply Assembly Removal and Replacement 8-3
8-16. HV Multiplier Assembly Removal and Replacement 8-3
8-17. LV Power Supply Assembly Removal and Replacement 8-3
8-18. Gate Amplifier Assembly Removal and Replacement 8-4
8-19. Vertical Output Amplifier Assembly Removal and Replacement 8-4
8-21. Vertical Preamplifier Assembly A3, Delay Line Assembly A4, and Vertical Control Switching Assembly A13 Removal and Replacement 8-6
8-25. Horizontal Output Assembly Removal and Replacement 8-7
8-26. Horizontal Sweep Assembly Removal and Replacement 8-7
8-27. Delayed Trigger Assembly Removal and Replacement 8-7
8-28. Circuit Board Repairs 8-7
8-30. Board Connections 8-7
8-31. Soldering 8-7
8-32. Integrated Circuit Removal and Replacement 8-8
8-33. Troubleshooting 8-8
8-36. Initial Troubleshooting Procedure 8-8
8-37. Dc Voltages and Waveforms 8-8
8-38. Trouble Diagnosis 8-8
8-39. LV Power Supply 8-9
8-41. HV Power Supply 8-9
8-47. Gate Amplifier 8-9
8-48. Vertical Section 8-10
8-51. Horizontal Output Amplifier 8-10
8-52. Time Base 8-10

LIST OF ILLUSTRATIONS

Figure Title Page
2-1. Types of Power Source Receptacles and Applicable Input Power Cable Part Numbers 2-1
2-2. Line Voltage Selection Switch Settings 2-1
3-1. Controls and Connectors 3-0
3-2. Probe Compensation 3-2
3-3. Normal Display 3-3
3-4. Magnified Display 3-3
3-5. Normal Display with Intensified Area .. 3-3
3-6. Delayed Sweep Display 3-3
3-7. Normal Display with Intensified Area .. 3-4
3-8. Mixed Sweep Display 3-4

Figure Title Page
4-1. Vertical and Horizontal Block Diagram 4-3
4-2. LVPS, HVPS, and Gate Amplifier Block Diagram 4-4
4-3. Gate Schmitt Simplified Block Diagram 4-7
4-4. Timing Relationship of the Gate and Sweep Waveforms 4-7
4-5. Gate Control Simplified Block Diagram 4-8

5-1. Bandwidth Test Setup 5-3
5-2. CMRR Test Setup 5-3
5-3. External Triggering Test Setup 5-4
5-4. Pulse Response Adjustments 5-15

LIST OF ILLUSTRATIONS (Cont'd)

Figure Title Page

5-5. Adjustment Locations 5-23

6-1. Chassis Parts and Board Assembly Identification 6-1

7-1. Replacement for Component Locator in Figure 8-16 7-2
7-2. Replacement for Component Locator in Figure 8-17 7-3
7-3. Replacement for Component Locator in Figure 8-19 7-4
7-4. Replacement for Component Locator in Figure 8-10 7-6
7-5. Changes to Schematic 1 7-7
7-6. Rear-panel Changes 7-7

8-1. Switch Extender Shaft Removal 8-1
8-2. CRT Removal 8-2
8-3. Low-voltage Power Supply Removal 8-4
8-4. Gate Amplifier Assembly Removal 8-5
8-5. Vertical Output Amplifier Removal 8-5
8-6. A5A1 Removal 8-5
8-7. A3A1 Removal 8-7
8-8. Location of A7 Attaching Screws 8-7
8-9. Semiconductor Terminal Identification 8-8
8-10. Service Information, Low-voltage Power Supply Assembly A16 8-12
8-11. Service Information, High-voltage Power Supply Assembly A15 8-14
8-12. Service Information, Gate Amplifier Assembly A12 8-16
8-13. Service Information, Vertical Preamplifier Assembly A3 8-18
8-14. Service Information, Vertical Output Assembly A5 8-20
8-15. Service Information, Vertical Control Switching Assembly A13 and Vertical Preamplifier Assembly A3 8-22
8-16. Service Information, Main Trigger, P/O Assembly A7 8-24
8-17. Service Information, Main Sweep Assembly A8 8-26
8-18. Service Information, Delayed Trigger Assembly A10 and Horizontal Sweep Assembly A7 8-28
8-19. Service Information, Delayed Sweep Assembly A9 8-30
8-20. Service Information, Horizontal Output Assembly A11 and Horizontal Sweep Assembly A7 8-32
8-21. Service Information, Gate Schmitt, P/O Assembly A7 8-34
8-22. Service Information, Interface Assembly A14 8-37
8-23. Service Information. OPTION 101 Interface Assembly A14 8-38
8-24. Interconnection Diagram 8-40

LIST OF TABLES

Table Title Page

1-1. Specifications 1-2
1-2. General Information 1-4

3-1. Display and Trigger Selection Table 3-2

5-1. Recommended Test Equipment 5-2
5-2. Main TIME/DIV Accuracy 5-5
5-3. Delayed TIME/DIV Accuracy 5-6
5-4. Deflection Factor Accuracy 5-8
5-5. Low-voltage Supply Limits 5-8
5-6. Preliminary Main Sweep Calibration 5-12
5-7. Delayed Sweep Calibration Adjustments 5-12
5-8. Main Sweep Fine Adjustment 5-13
5-9. Condensed Adjustment Procedure 5-16

6-1. Abbreviations for Replaceable Parts List 6-1
6-2. Replaceable Parts 6-3
6-3. List of Manufacturer Codes 6-21

7-1. Manual Changes 7-1

8-1. Troubleshooting Sequence 8-9
8-2. Time Base Troubleshooting 8-10
8-3. Schematic Notes 8-11

SECTION I

GENERAL INFORMATION

1-1. INTRODUCTION.

1-2. The Hewlett-Packard Model 1740A is a dual-channel, 100-MHz, delayed sweep oscilloscope designed for general-purpose bench or field use. The dual-channel vertical deflection system has 12 calibrated deflection factors from 5 mV/div to 20 V/div. Input impedance is selectable (50 ohms or 1 megohm) to meet various measurement requirements. The horizontal deflection system has calibrated sweep rates from 2 s/div to 0.05 μs/div and delayed sweep rates from 20 ms/div to 0.05 μs/div. A 10X magnifier expands all sweeps by a factor of 10 and extends the fastest sweep to 5 ns/div. In alternate or chop modes, the trigger-view control feature will display three signals: channel A, channel B, and trigger signal. This allows correlation of the time between the trigger signal and the channel A and channel B signals. With the A VS B control, an X-Y mode of operation is possible. The channel A input (Y-axis) is plotted versus the channel B input (X-axis).

1-3. This manual contains installation and operating instructions, as well as maintenance information for the Model 1740A. Instrument specifications and procedures for verifying proper operation are included. Procedures are also included for adjusting the instrument to its performance specifications. Schematic diagrams, the theory of operation, and troubleshooting information are provided for use in maintaining the instrument.

1-4. This section of the manual contains the performance specifications for the Model 1740A, and a list of the options available. It also lists the accessories supplied with the Model 1740A and other accessories that are available. Instrument and manual identification information are also included.

1-5. SPECIFICATIONS.

1-6. Table 1-1 is a complete list of the Model 1740A critical specifications that are controlled by tolerances. Table 1-2 contains general information that describes operating characteristics of the Model 1740A.

1-7. Any change in the specifications due to manufacturing, design, or traceability to the U.S. National Bureau of Standards will be listed on a manual change sheet included with this manual. The manual and manual change sheet supersede all previous information concerning specifications of the 1740A.

1-8. ACCESSORIES SUPPLIED.

1-9. The following accessories are supplied with the 1740A:

One Blue Light Filter, HP Part No. 01740-02701
One Front-panel Cover, HP Part No. 5040-0516
One Accessory Storage Pouch, HP Part No. 1540-0292
Two 10:1 Divider Probes, HP Model No. 10006D

1-10. ACCESSORIES AVAILABLE.

1-11. The following accessories are available for the 1740A:

Model 10002A 50:1 Divider Probe
Model 10004D 10:1 Divider Probe
Model 10007B 1:1 Divider Probe
Model 10020A Resistive Divider Prove Kit (Division ratios of 1:1, 5:1, 10:1, 20:1, 50:1, and 100:1)
Model 10173A: RFI Metal Mesh Contrast Screen
Model 10140A: Collapsible Viewing Hood
Model 197A: Oscilloscope Camera (Requires a Model 10376A Adapter for mounting on 1740A)
Models 1001A, 1002A, and 1114A: Testmobiles (All accept the Model 1740A and provide mobile stands for the oscilloscope)

1-12. OPTIONS.

1-13. The options listed below extend the usefulness of the Model 1740A.

OPTION 001. Option 001 replaces the standard detachable power cord with a captive power cord. There are two standard options available that install a special CRT in the standard instrument. The only difference between the optional CRT and the standard CRT is the phosphor used in the CRT. Option 007 uses P7 phosphor and Option 011 uses P11 phosphor.

OPTION 090. This option omits the two Model 10006D divider probes normally supplied as accessories. Other probes listed under Accessories Available, which are more suitable, may be specified.

OPTION 101. Option 101 is designed for optimum performance with the HP Model 1607A Logic State Analyzer to provide both digital logical state and analog electrical analysis. (Refer to Section IV for circuit details and Section VI for a list of replaceable parts in Option 101.)

OPTION 102. Option 102 is Option 101 with an additional special adapter plate (HP Part No. 5061-1213). The special adpater plate is used to attach the 1740A and 1607A instruments together as a single unit.

OPTIONS 900 - 903. Options 900 through 903 are special cord options. The connector configurations are shown in Section II of this manual.

1-14. INSTRUMENT AND MANUAL IDENTIFICATION.

1-15. Instrument identification by serial number is located on the rear panel. Hewlett-Packard uses a two-section serial number consisting of a four-digit prefix and a five-digit suffix, separated by a letter designating the country in which the instrument was manufactured. (A = U.S.A; G = West Germany; J = Japan; U = Unit Kingdom.)

1-16. This manual applies to instruments with a serial prefix number as shown on the title page. If changes have been made in the instrument since this manual was printed, a "Manual Changes" supplement supplied with the manual will define these changes. Be sure to record these changes in your manual. Backdating information in Section VII adapts the manual to instruments with serial numbers lower than that shown on the title page. Part numbers for the manual and the microfiche copy of the manual are also shown on the title page.

Table 1-1. Specifications

VERTICAL DISPLAY MODES

Channel A; channel B; channels A and B displayed alternately on successive sweeps (ALT); channels A and B displayed by switching between channels at an approximate 250 kHz rate with blanking during switching (CHOP); channel A plus channel B (algebraic addition); and trigger view.

VERTICAL AMPLIFIERS (2)

Bandwidth and Rise Time at all deflection factors from 0°C to +55°C.

BANDWIDTH: 3 dB down from 6 div reference signal.

DC-Coupled: dc to 100 MHz in both 50Ω and 1 MΩ input modes.

AC-Coupled: approx 10 Hz to 100 MHz; 1 Hz with 10:1 divider probes.

BANDWIDTH LIMIT: limits upper bandwidth to approx 20 MHz.

RISE TIME: ≤3.5 ns, measured from 10% to 90% points of a 6 div input step.

DEFLECTION FACTOR

Ranges: 5 mV/div to 20 V/div (12 calibrated positions) in 1, 2, 5 sequence, accurate within 3%.

Vernier: continuously variable between all ranges, extends maximum deflection factor to at least 50 V/div. UNCAL light indicates when vernier is not in the CAL position.

POLARITY: channel B may be inverted, front panel pushbutton.

DELAY LINE: input signals are delayed sufficiently to view leading edge of input pulse without advanced trigger.

INPUT COUPLING: selectable AC or DC, 50Ω (dc), or ground. Ground position disconnects input connector and grounds amplifier input.

INPUT RC (selectable)

AC or DC: 1 MΩ ±2% shunted by approx 20 pF.

50 Ohm: 50Ω ±3%; SWR ≤1.4 at 100 MHz on all ranges.

MAXIMUM INPUT

AC or DC: 250 V (dc + peak ac) or 500 V p-p at 1 kHz or less.

50 Ohm: 5 V rms.

A+B OPERATION

Amplifier: bandwidth and deflection factors are unchanged; channel B may be inverted for A—B operation.

Differential (A—B) Common Mode: CMRR is at least 20 dB from dc to 20 MHz. Common mode signal amplitude equivalent to 8 divisions with one vernier adjusted for optimum rejection.

VERTICAL MAGNIFICATION (X5)

BANDWIDTH: 3 dB down from 8 div reference signal.

DC-Coupled: dc to approx 40 MHz.

AC-Coupled: approx 10 Hz to 40 MHz.

RISE TIME: ≤9 ns (measured from 10% to 90% points of 8 div input step).

DEFLECTION FACTOR: increases sensitivity of each deflection factor setting by a factor of 5 with a maximum sensitivity of 1 mV on channels A and B.

TRIGGER SOURCE

Selectable from channel A, channel B, composite, or line frequency.

CHANNEL A: all display modes triggered by channel A signal.

CHANNEL B: all display modes triggered by channel B signal.

COMPOSITE: all display modes triggered by displayed signal except in Chop. In Chop mode, trigger signal is derived from channel A.

LINE FREQUENCY: trigger signal is derived from power line frequency.

TRIGGER VIEW

Display internal or external trigger signal in Alternate or Chop mode, channel A, channel B, and the trigger signals are displayed. In channel A or B mode, Trigger View overrides that channel. Internal trigger signal amplitude approximates vertical signal amplitude. Ext trigger signal deflection factor is approx 100 mV/div or 1 V/div in EXT ÷10. Triggering point is approx center screen. With identically timed signals to a vertical input and the Ext trigger input, trigger signal delay is 2.5 ns ±1 ns.

HORIZONTAL DISPLAY MODES

Main, main intensified, mixed, delayed, mag X10, and A vs. B.

Table 1-1. Specifications (Cont'd)

MAIN AND DELAYED TIME BASES

RANGES

Main: 50 ns/div to 2 s/div (24 ranges) in 1, 2, 5 sequence.

Delayed: 50 ns/div to 20 ms/div (18 ranges) in 1, 2, 5 sequence.

Accuracy

Sweep Time/Div	*Accuracy		Temp Range
	X1	X10	
50 ns to 20 ms	±3% ±2% ±3%	±4% ±3% ±4%	0°C to +15°C +15°C to +35°C +35°C to +55°C

*Add 1% for 50 ms to 2 s ranges.

MAIN SWEEP VERNIER: continuously variable between all ranges, extends slowest sweep to at least 5 s/div. UNCAL light indicates when vernier is not in CAL position.

MAGNIFIER (X10): expands all sweeps by a factor of 10, extends fastest sweep to 5 ns/div.

CALIBRATED SWEEP DELAY

DELAY TIME RANGE: 0.5 to 10 X Main Time/Div settings of 100 ns to 2 s (minimum delay 150 ns).

DIFFERENTIAL TIME MEASUREMENT ACCURACY

Main Time Base Setting	*Accuracy (+15°C to +35°C)
100 ns/div to 20 ms/div	±(0.5% + 0.1% of full scale)
50 ms/div to 2 s/div	±(1% + 0.1% of full scale)

*Add 1% for temperatures from 0°C to +15°C and +35°C to +55°C.

DELAY JITTER: <0.002% (1 part in 50 000) of maximum delay in each step from +15°C to +35°C; <0.005% (1 part in 20 000) from 0°C to +15°C and +35°C to +55°C.

TRIGGERING

MAIN SWEEP

Normal: Sweep is triggered by internal or external signal.

Automatic: bright baseline displayed in absence of input signal. Triggering is same as Normal above 40 Hz.

Single: sweep occurs once with same triggering as Normal; reset pushbutton arms sweep and lights indicator.

DELAYED SWEEP (SWEEP AFTER DELAY)

Auto: delayed sweep automatically starts at end of delay.

Trig: delayed sweep is armed and triggerable at end of delay period.

INTERNAL: dc to 25 MHz on signals causing 0.3 divisions or more vertical deflection, increasing to 1 division of vertical deflection at 100 MHz in all display modes (required signal level is increased by 2 when in Chop mode and by 5 when X5 vertical magnifier is used). Triggering on Line frequency is also selectable.

EXTERNAL: dc to 50 MHz on signals of 50 mV p-p or more increasing to 100 mV p-p at 100 MHz (required signal level is increased by 2 when in Chop mode).

EXTERNAL INPUT RC: approx 1 MΩ shunted by approx 20 pF.

MAXIMUM EXTERNAL INPUT: 250 V (dc + peak ac) or 500 V p-p ac at 1 kHz or less.

LEVEL and SLOPE

Internal: at any point on the positive or negative slope of the displayed waveform.

External: continuously variable from +1.5 V to —1.5 V on either slope of the trigger signal, +15 V to —15 V in divide by 10 mode (÷10).

COUPLING: AC, DC, Main LF REJ, or Main HF REJ.

AC: attenuates signals below approx 20 Hz.

LF Reject (Main Sweep): attenuates signals below approx 4 kHz.

HF Reject (Main Sweep): attenuates signals above approx 4 kHz.

TRIGGER HOLDOFF (Main Sweep): increases sweep holdoff time in all ranges.

CALIBRATED MIXED TIME BASE

Dual time base in which the main time base drives the first portion of sweep and the delayed time base completes the sweep at the faster delayed sweep. Also operates in single sweep mode. Accuracy, add 2% to main time base accuracy.

A vs. B OPERATION

BANDWIDTH

Channel A (Y-axis): same as channel A.

Channel B (X-axis): dc to 5 MHz.

DEFLECTION FACTOR: 5 mV/div to 20 V/div (12 calibrated positions) in 1, 2, 5 sequence.

PHASE DIFFERENCE BETWEEN CHANNELS: <3°, dc to 100 kHz.

Table 1-2. General Information

CATHODE-RAY TUBE AND CONTROLS

TYPE: Hewlett-Packard, 12.7 cm (5 in.) rectangular CRT, post accelerator, approx 15 kV accelerating potential, aluminized P31 phosphor.

GRATICULE: 8 X 10 div (1 div = 1 cm) internal, non-parallax graticule with 0.2 subdivision markings on major horizontal and vertical axes and markings for rise time measurements. Internal floodgun graticule illumination.

BEAM FINDER: returns trace to CRT screen regardless of setting of horizontal, vertical, or intensity controls.

Z-AXIS INPUT (INTENSITY MODULATION): +4 V, ≥50 ns width pulse blanks trace of any intensity, usable to ≤10 MHz for normal intensity. Input R, 1 kΩ ±10%. Maximum input ±20 V (dc + peak ac).

REAR PANEL CONTROLS: astigmatism and trace align.

GENERAL

REAR PANEL OUTPUTS: main and delayed gates, 0 V to >+2.5 V capable of supplying approx 5 mA.

AMPLITUDE CALIBRATOR (0°C to +55°C)

Output Voltage	1 V p-p into ≥1 MΩ 0.1 V p-p into 50Ω	±1%
Rise Time	≤0.1 µs	
Frequency	approx 1.4 kHz	

POWER: 100, 120, 220, 240 Vac, ±10%; 48 to 440 Hz; 100 VA max.

WEIGHT: net, 13 kg (28.6 lb); shipping, 15.7 kg (34.6 lb).

OPERATING ENVIRONMENT

Temperature: 0°C to +55°C.

Humidity: to 95% relative humidity at +40°C.

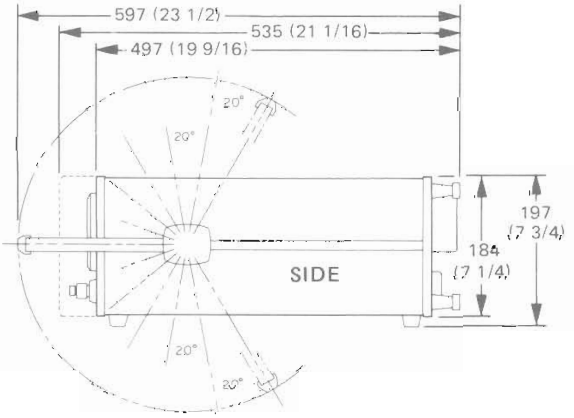
Altitude: to 4600 m (15 000 ft).

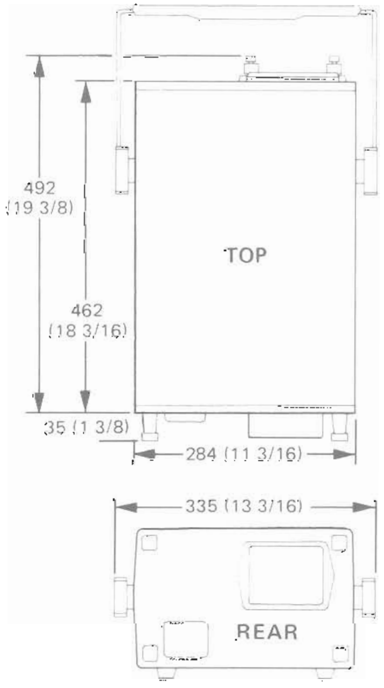
Vibration: vibrated in three planes for 15 min. each with 0.254 mm (0.010 in.) excursion, 10 to 55 Hz.

DIMENSIONS: see outline drawing.

NOTES:

1. DIMENSIONS ARE FOR GENERAL INFORMATION ONLY. IF DIMENSIONS ARE REQUIRED FOR BUILDING SPECIAL INCLOSURES, CONTACT YOUR HP FIELD ENGINEER.
2. DIMENSIONS ARE IN MILLIMETERS AND (INCHES).





SECTION II

INSTALLATION

2-1. INTRODUCTION.

2-2. This section contains information and instructions necessary for installing and interfacing the Model 1740A Oscilloscope. Included are initial inspection procedures, power and grounding requirements, installation instructions, and procedures for repackaging the instrument for shipment.

2-3. INITIAL INSPECTION.

2-4. This instrument was carefully inspected both mechanically and electrically before shipment. It should be free of mars or scratches and in perfect electrical order upon receipt. To confirm this, the instrument should be inspected for physical damage incurred in transit. If the instrument was damaged in transit, file a claim with the carrier. Check for supplied accessories (listed in Section I) and test the electrical performance of the instrument using the performance test procedures outlined in Section V. If there is damage or deficiency, see the warranty in the front of this manual.

WARNING

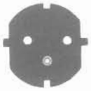
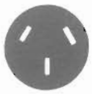
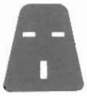
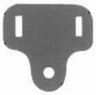
Read the Safety Summary at the front of the manual before installing or operating the instrument.

2-5. POWER CORDS AND RECEPTACLES.

2-6. Figure 2-1 illustrates the standard configuration used for HP power cords. The HP part number directly above each drawing is the part number for an instrument power cord equipped with a connector of that configuration. If the appropriate power cord is not included with the instrument, notify the nearest HP Sales and Service Office and a replacement cord will be provided.

STD-002-07-76

HP POWER CABLE PART NUMBERS

8120-1692	8120-0696	8120-1703	8120-1521
Option 902	Option 901	Option 900	Option 903
			

INPUT POWER RECEPTACLE TYPES

Figure 2-1. *Types of Power Source Receptacles and Applicable Input Power Cable Part Numbers*

2-7. POWER REQUIREMENTS.

2-8. The 1740A can be operated from any power source supplying 100 V, 120 V, 220 V, or 240 V (±10%), single phase, 48 to 440 Hz. Power dissipation is 100 VA maximum.

CAUTION

Instrument damage may result if line-voltage selection switch is not correctly set for the input power source.

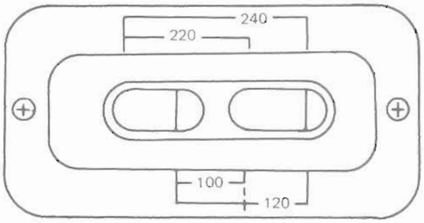
2-9. The instrument is normally set at the factory for 120-volt operation. To operate the instrument from any other ac power source, proceed as follows:

a. Verify that Model 1740A power cable is not connected to any input power source.

b. Stand instrument on rear legs. Use a blade-type screwdriver to position line-voltage selection switch through opening in bottom cover. (Figure 2-2 shows switches set for 120-V operation.)

c. For 220-V or 240-V inputs, replace fuse F1 with 0.5 A slow-blow fuse supplied with instrument.

d. Connect input power cable to power source.



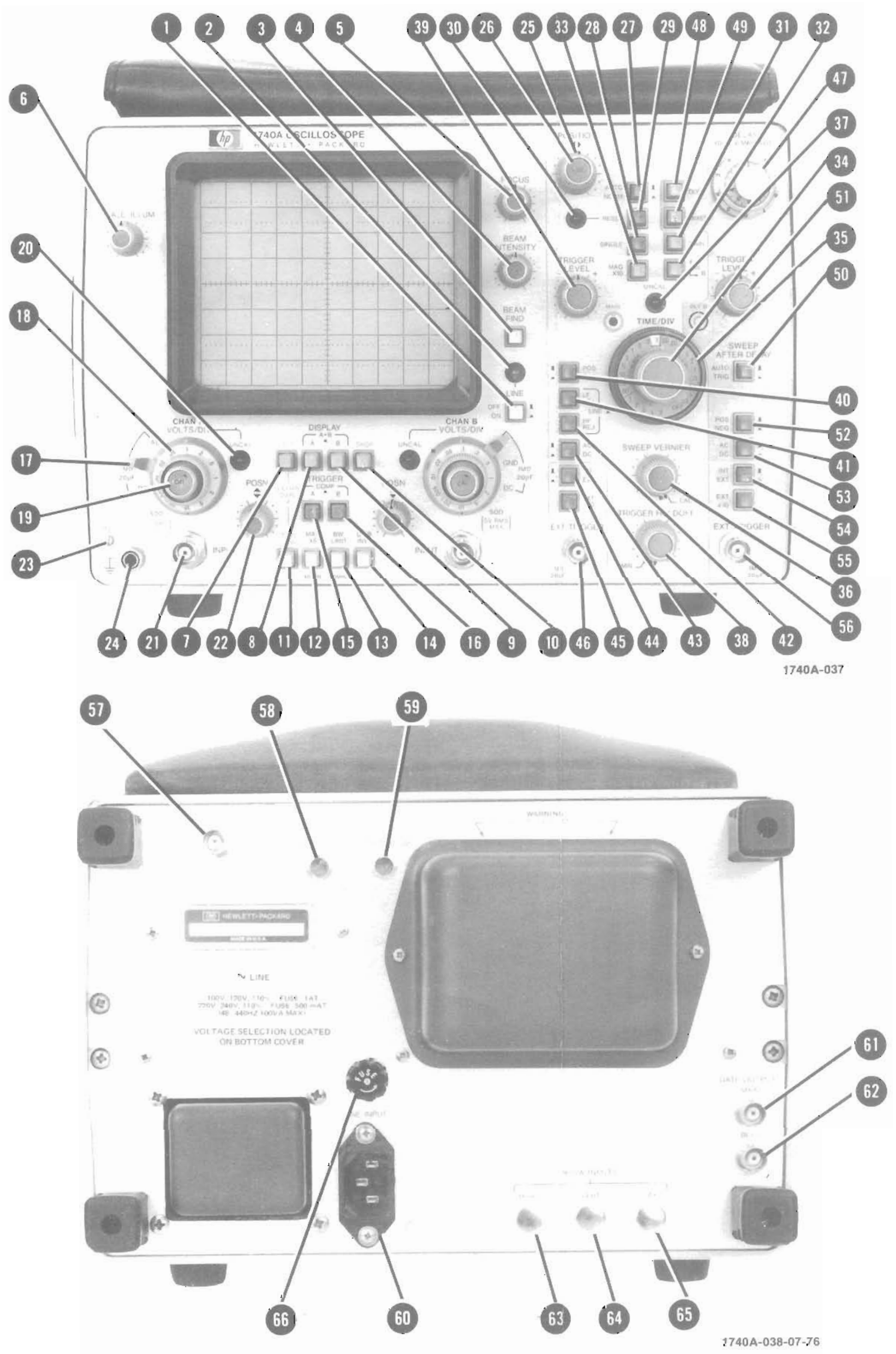
1740A-200-07-76

Figure 2-2. Line Voltage Selection Switch Settings

2-10. REPACKING FOR SHIPMENT.

2-11. If the instrument is to be shipped to a Hewlett-Packard Sales/Service Office for service or repair, attach a tag showing owner (with address), complete instrument serial number, and a description of the service required.

2-12. Use the original shipping carton and packing material. If the original packing material is not available, the Hewlett-Packard Sales/Service Office will provide information and recommendations on materials to be used.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1740A OSCILLOSCOPE
HEWLETT · PACKARD
FOCUS
BEAM INTENSITY
BEAM FIND
LINE
OFF
ON
CHAN A VOLTS/DIV
CHAN B VOLTS/DIV
DISPLAY
A+B
A
B
CHOP
TRIGGER
COMP
POSN
INPUT
UNCAL
TRIGGER LEVEL
TIME/DIV
SWEEP AFTER DELAY
SWEEP VERNIER
TRIGGER HOLDOFF
EXT TRIGGER
57
58
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62
66
60
63
64
65
HEWLETT-PACKARD
LINE
VOLTAGE SELECTION LOCATED ON BOTTOM COVER
FUSE

1740A-037

1740A-038-07-76

Figure 3-1.
Controls and Connectors

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① **LINE.** Switch turns instrument power on and off.

② **LINE INDICATOR.** Indicator lights when the instrument power is on.

③ **BEAM FIND.** Pressing this pushbutton increases the intensity and compresses the display within the viewing area.

④ **BEAM INTENSITY.** Controls the brightness of the CRT display.

⑤ **FOCUS.** Adjusts the writing beam for the sharpest trace. Always keep this display focused to prevent damaging the CRT internally.

⑥ **SCALE ILLUM.** Adjust the CRT background illumination for good contrast between the background and the graticule.

⑦ **ALT.** Channel A and B signals are displayed alternately on consecutive sweeps.

⑧ **Channel A.** Displays the channel A input signal.

⑨ **Channel B.** Displays the channel B input signal.

⑧ & ⑨ **A+B.** Pressing both channel A ⑧ and channel B ⑨ displays the algebraic sum of the channel A and channel B input signals. If the channel B display is inverted (press CH B INVT ⑭), an A minus B display results.

⑩ **CHOP.** Channel A and B signals are displayed simultaneously by switching between channels at a 250-kHz rate.

⑪ **TRIG VIEW.** Displays the selected internal or external trigger signal at a fixed sensitivity of approximately 100 mV/div or 1 V/div with EXT ÷ 10㊺. TRIGGER LEVEL ㊴ positions the display vertically. Center screen indicates the trigger threshold level with respect to the trigger signal. If ALT ⑦ or CHOP ⑩ is selected, three signals are displayed: channel A, the selected trigger signal (at center screen), and channel B.

⑫ **MAG X5.** Magnifies the vertical presentation five times, and increases the maximum sensitivity to 1 mV/div. The bandwidth is decreased to 40 MHz.

⑬ **BW LIMIT.** Reduces the bandwidth of channel A and channel B to approximately 20 MHz.

⑭ **CH B INVT.** Inverts the polarity of the channel B signal. In A+B ⑧ & ⑨ mode, pressing CH B INVT ⑭ results in an A minus B display.

⑮ **TRIGGER A.** Selects a sample of the channel A signal as the trigger signal when INT/EXT ㊹ is in INT.

⑯ **TRIGGER B.** When in INT, a sample of the channel B signal is selected as the trigger signal.

⑮ & ⑯ **COMP.** When the display mode is set to channel A, channel B, ALT, or A+B, the sweep is triggered by the displayed signal. When in CHOP, the sweep is triggered by the channel A signal only.

⑰ **AC.** Selects the input coupling and impedance for the vertical amplifiers. In the AC position the dc component of the input signal is blocked. The lower 3-dB limit is approximately 10 Hz.

GND. The input signal is disconnected from the amplifier, and the amplifier input is grounded.

DC. All elements of the input signal are passed to the vertical amplifier. The input impedance is approximately 1 megohm shunted by 20 pF.

50Ω. The input signal is dc coupled, and the input impedance is 50Ω. Pull the lever forward and down to select this position. Do not apply more than 5 V rms to the input connector.

⑱ **VOLTS/DIV.** Selects the vertical deflection factor in a 1, 2, 5 sequence from 0.005 V/div to 20 V/div, accurate within 3% with vernier ⑲ in the CAL position.

⑲ **Vernier.** Provides continuous control of the deflection factor between calibrated VOLTS/DIV ranges. Vernier range is at least 2.5 to 1.

⑳ **UNCAL.** Lights when the vernier control is out of detent position to indicate VOLTS/DIV is uncalibrated.

㉑ **INPUT.** BNC connector to apply external signals to the channel A (Y) and channel B (X) amplifier. Impedance and coupling are selectable by ⑰. Do not apply more than 250 V (dc + peak ac) or more than 500 V p-p ac at 1 kHz or less.

㉒ **POSN.** Controls the vertical position of the display.

㉓ **CAL 1 V.** Provides a 1-V peak-to-peak (within 1%) square-wave voltage signal recurring at an approximate rate of 1.4 kHz (100 mV peak-to-peak when terminated in 50Ω).

㉔ **GROUND POST.** Convenient chassis ground connector. Useful to ensure a common ground with equipment under test.

㉕ & ㉖ **POSITION.** Coarse ㉕ and FINE ㉖ adjustments position the display horizontally.

㉗ **AUTO/NORM.** AUTO sweep mode (pushbutton out). A free running sweep provides a bright display in the absence of a trigger signal.
NORM sweep mode (pushbutton in) requires an internal or external signal to generate a sweep and must be used if the input frequency is less than 40 Hz.

㉘ **SINGLE.** Sweep occurs once with the same triggering as in NORM. After each sweep, the trigger circuit must be manually RESET ㉙.

㉙ **RESET.** Momentary pushbutton that arms the trigger circuit in the single-sweep mode. After pressing RESET ㉙, the sweep can be triggered by an internal or external trigger signal or by rotating the TRIGGER LEVEL control ㊴ through zero.

㉚ **Reset Lamp.** When lit, indicates the trigger circuit is armed. Lamp goes off at the end of the sweep and remains off until the trigger circuit is again armed by pressing the reset button.

㉛ **MAIN.** Selects main sweep for horizontal display. Sweep rate and triggering are selected by the main-sweep controls ㉕ - ㉞, and ㊱ - ㊳.

㉜ **A VS B.** Selects an X-Y mode of operation with channel A input (Y-axis) plotted versus channel B input (X-axis). Vertical positioning is adjusted by channel A POSN ㉒, and horizontal positioning is adjusted by POSITION ㉕ and FINE ㉖.

OPTION 101. Deletes the A VS B function and adds logic state display. When the Model 1740A is connected to a HP Model 1607A Logic State Analyzer, pressing STATE DSPL ㉜ displays a 16-word table of 16-bit words.

㉝ **MAG X10.** Magnifies the horizontal display 10 times, and expands the fastest sweep time to 5 ns/div, maintaining a sweep accuracy within 3% at room temperature.

㉞ **MAIN TIME/DIV.** The inner knob controls the main-sweep rate, which is indicated by the numbers displayed in the knob skirt opening. Sweep accuracy is within 2% (unmagnified) at room temperatures.

㉟ **DLY'D TIME/DIV.** The outer rotating section selects the delayed-sweep rate, which is indicated by the marker on the outer knob. Sweep accuracy is the same as with MAIN TIME/DIV. An interlock is incorporated so the delayed sweep is always faster than the main sweep. When rotated out of the off position in the MAIN mode ㉛, a portion of the main sweep is intensified indicating the length and delay position of the delayed sweep with respect to the main sweep.

㊱ **SWEEP VERNIER.** Provides continuous adjustment of main sweep TIME/DIV between calibrated positions, extending the slowest sweep to 5 s/div.

㊲ **UNCAL.** Lights when SWEEP VERNIER ㊱ is out of the CAL detent position, and indicates that the sweep is not calibrated.

㊳ **TRIGGER HOLDOFF.** Increases the time between sweeps and aids triggering on complex displays such as digital words.

㊴ & (51) **TRIGGER LEVEL.** Selects the voltage level on the input trigger signal where the sweep is triggered. With external trigger signals, the trigger level is continuously variable from +1.5 V to —1.5 V on either slope of the input trigger signal; +15 V to —15 V in EXT ÷ 10 ㊺ mode. With internal trigger signals, the trigger level selects any point on the vertical waveform displayed.

㊵ & (52) **POS/NEG.** Two-position pushbutton switch that selects the slope of the (EXT ㊹ or INT ㊹) trigger siganl used to start the sweep.

㊶ **LF REJ.** Attenuates internal or external trigger signals below approximately 4 kHz. This is useful to condition high-frequency signals for best synchronization by eliminating unwanted high-frequency signals such as power line interference.

㊷ **HF REJ.** Attenuates internal or external trigger signals above approximately 4 kHz. This is useful to condition low-frequency signals for best synchronization by eliminating unwanted high-frequency signals such as RF.

㊶ & ㊷ **LINE.** Selecting both LF REJ ㊶ and HF REJ ㊷ removes all EXT ㊹ input or INT ㊹ displayed signals from the trigger circuit and applies a power-line frequency signal for triggering.

㊸ & (53) **AC/DC.** Selects ac or dc coupling of the input (EXT ㊹ or (54)) or displayed (INT ㊹ or (54)) signal to the trigger circuit. The DC position must be selected for signals below approximately 20 Hz.

㊹ & (54) **INT/EXT.** INT selects a sample of the internal vertical signal chosen by the TRIGGER source ⑮ or ⑯, while EXT selects the signal at the EXT TRIGGER ㊻ or (56) input for application to the main trigger circuit.

㊺ & (55) **EXT ÷ 10.** Attenuates EXT TRIGGER ㊻ or (56) input signal by a factor of 10.

㊻ & (56) **EXT TRIGGER.** BNC connector for external trigger input. Input impedance is approximately one megohm shunted by approximately 20 pF. Do not apply more than 250 V (dc + peak ac) or 500 V p-p ac at 1 kHz or less.

㊼ **DELAY.** The DELAY control provides a variable delay time from 0.5 to 10X the MAIN TIME/DIV settings of 100 ns to 2 s.

㊽ **DLY'D.** Selects delayed sweep for horizontal display.

㊾ **MIXED.** Selects main and delayed sweeps for the horizontal display. The first portion of the sweep is at the main sweep rate, and the second portion of the sweep (starting point chosen by DELAY ㊼) is at the delayed-sweep rate.

㊿ **SWEEP AFTER DELAY AUTO/TRIG.** Selects the method of starting the delayed-sweep when in main intensified, delayed, or mixed mode operation. In AUTO, delayed sweep starts immediately after the delay interval, which is the product of the DELAY ㊼ dial reading (div) and the main TIME/DIV ㉞ reading. In TRIG, the delayed-trigger circuit is armed after the delay interval and delayed sweep must be triggered by either an internal or external trigger signal.

(57) **Z-AXIS INPUT.** BNC connector for intensity modulation of the CRT display. A +4-volt, ≥50-ns width pulse blanks a trace of any intensity. Do not apply more than ±20 V (dc + peak ac).

(58) **TRACE ALIGN.** Screwdriver adjustment to align the horizontal trace with the graticule.

(59) **ASTIGMATISM.** Screwdriver adjustment used in conjunction with FOCUS ⑤ to achieve a clean, sharp spot or trace. Adjustment is easier with a stationary spot.

(60) **LINE INPUT.** Connector for the power cord.

(61) **MAIN GATE OUTPUT.** Provides a rectangular output of approximately +2.5 V coincident with the main gate.

(62) **DLY'D GATE OUTPUT.** Provides a rectangular output of approximately +2.5 V coincident with the delayed gate.

(63) - (65) **1607A INPUTS.** Option 101 only.

(63) **HORIZ.** X-axis input from HP Model 1607A.

(64) **VERT.** Y-axis input from HP Model 1607A.

(65) **Z-AXIS.** Intensity input from HP Model 1607A.

(66) **FUSE.** 1 A 250 V SLO-BLO for 100-V or 120-V operation. 0.5 A 250 V SLO-BLO for 220-V or 240-V operation.

SECTION III

OPERATION

3-1. INTRODUCTION.

3-2. This section provides general operating instructions for Model 1740A. Front- and rear-panel controls and connectors are identified and described in figure 3-1. An initial turn-on procedure, operators calibration, trigger selection table, and procedures for obtaining basic displays are also included. The index numbers after control and connector names in the text are keyed to figure 3-1.

3-3. TURN-ON PROCEDURE.

WARNING

Before turning on the oscilloscope, read the safety summary located at the front of this manual.

3-4. To turn on the Model 1740A, perform the following steps:

a. Turn all control knobs to the 12 o'clock position except verniers ⑲ and SWEEP VERNIER ㊱ should be in CAL position; TRIGGER HOLDOFF ㊳ on MIN. MAIN TIME/DIV ㉞ fully clockwise.

b. Verify pushbuttons out except A ⑧, A ⑮, and MAIN ㉛

c. Press LINE switch ①; LINE indicator ② should light. After CRT warm up, a free-running trace should be observed near center screen.

d. Increase (or decrease) BEAM INTENSITY ④ to comfortable viewing level, and adjust FOCUS ⑤ as necessary for sharpest trace.

3-5. OPERATOR CHECKS.

3-6. A few checks and adjustments may be required to verify that the Model 1740A is operating properly. If the oscilloscope is moved from one electromagnetic environment to another, the trace alignment control may need adjustment to align the horizontal trace with the graticule. Astigmatism and focus controls may need adjustment to obtain the sharpest display. Probe compensation may be required, since total input resistance and capacitance can vary slightly from one oscilloscope to another.

3-7. Adjust trace alignment as follows:

a. Obtain a display as described in the turn-on procedure.

b. With vertical POSN control ㉒, align trace with center graticule line.

c. With a screwdriver, adjust TRACE ALIGN (58) (on rear panel) for best trace alignment with graticule line.

3-8. Adjust astigmatism and focus as follows:

a. Select A VS B ㉜ and lower BEAM INTENSITY ④ to a low level.

b. Position spot near center of CRT with POSN ㉒ and POSITION ㉕ controls.

c. Adjust FOCUS ⑤ and ASTIGMATISM (59) (on rear panel) for the smallest round spot.

3-9. Perform probe compensation adjustment as follows:

a. Connect probe to be compensated to appropriate vertical INPUT connector ㉑ and the CAL 1 V output ㉓.

b. Set VOLTS/DIV ⑱ to 0.1, MAIN TIME/DIV ㉞ to 0.2 mSEC, and input coupling ⑰ to DC.

c. Adjust main TRIGGER LEVEL ㊴ for a stable display of the calibrator square-wave voltage. Display should have flat tops. Any distortion in presentation is caused by incorrect probe compensation.

d. If overshoot or undershoot is present, turn screwdriver adjustment in probe for a flat-top presentation (see figure 3-2).

3-10. Perform vertical accuracy check as follows:

a. Set controls to positions indicated in turn-on procedure.

b. Apply CAL 1 V ㉓ signal to channel A INPUT ㉑ connector using a BNC to banana plug adapter and a test lead with alligator clips.

c. Adjust channel A VOLTS/DIV ⑱ to 0.2 V/div and MAIN TIME/DIV ㉞ to 0.2 mSEC/div. Square-

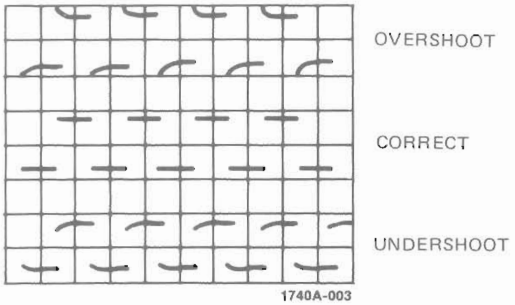


Figure 3-2. Probe Compensation

wave amplitude should be five major divisions within 4%. For complete calibration check, refer to Section V.

3-11. Perform timing accuracy check as follows:

a. Apply an accurate calibration signal (such as from HP Model 226A Time-mark Generator) to the channel A INPUT ㉑ connector.

b. Set controls to the positions indicated in the turn-on procedure except for MAIN TIME/DIV which should be adjusted to 0.5 μSEC/div.

c. Set marker on graticule line at far left with horizontal position control. Markers should line up approximately with each graticule line across the CRT. The marker on the far right-hand side should be within 2 mm of the graticule line.

3-12. TRIGGER SELECTION TABLE.

Table 3-1 will aid in determining the best trigger mode for various signal conditions.

3-13. OBTAINING BASIC DISPLAYS.

3-14. These procedures will aid the operator in becoming familiar with the operation of the Model 1740A so commonly used displays can be obtained. Before performing the procedures, complete the turn-on procedure and adjust the following controls:

Channel A TRIGGER	A ⑮
Channel A coupling	DC ⑰
Channel A VOLTS/DIV ⑱	0.05
MAIN TIME/DIV ㉞	0.5 mSEC
DELAY ㊼	fully CCW

3-15. NORMAL SWEEP DISPLAY.

a. Connect a Model 10006D probe to channel A INPUT ㉑ connector, CAL 1 V ㉓ output, and ground post ㉔.

Table 3-1. Display and Trigger Selection Table

SIGNAL CONDITIONS	DISPLAY MODE	TRIGGER SELECTION				
		A		B	COMP	EXT
I. Single Signals Applied to Channel A or B	A or B	OK	or	OK	OK	OK[1]
	ALT[5] or CHOP[5]	OK	or	OK	NG	OK[1]
II. Time Related Signals Applied to Channels A & B	ALT	$\boxed{\text{OK}}$[2]		$\boxed{\text{OK}}$[2]	NG[3]	$\boxed{\text{OK}}$[2]
	CHOP	$\boxed{\text{OK}}$[2]		$\boxed{\text{OK}}$[2]	NG[4]	$\boxed{\text{OK}}$[2]
	A+B (A—B)	OK		OK	(OK)[6]	OK
III. Nontime Related Signals Applied to Channels A & B	ALT	NG		NG	(OK)	NG

[1] Assume time related signal applied.

[2] Time relation displayed.

[3] No time relation displayed.

[4] If COMP is selected in CHOP, switching overrides and selects A.

[5] Signal is only displayed on one channel.

[6] Triggers on algebraic sum or difference of signals.

OK Useable trigger mode.

$\boxed{\text{OK}}$ Good trigger mode.

(OK) Best trigger mode.

NG Unuseable trigger mode.

b. Adjust POSN ㉒ to align base of square wave on the center graticule line, and adjust TRIGGER LEVEL ㊴ for a stable display. A square wave with an amplitude of two divisions and approximately five to nine positive-going pulses will be displayed.

3-16. MAGNIFIED SWEEP DISPLAY.

a. Perform paragraph 3-15 to obtain Normal Sweep Display.

b. Adjust horizontal POSITION ㉕ to place waveform portion to be magnified on CRT center graticule (see figure 3-3).

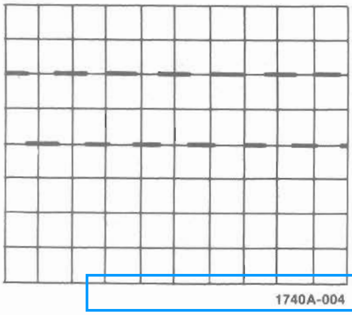


Figure 3-3. Normal Display

c. Press MAG X10 ㉝ and adjust horizontal FINE ㉖ for precise placement of magnified display (see figure 3-4).

3-17. DELAYED SWEEP DISPLAY.

a. Perform paragraph 3-15 to obtain Normal Sweep Display.

b. Adjust delayed TIME/DIV ㉟ for 50 μSEC/div, and observe intensified portion of square wave. Set BEAM INTENSITY ④ control to a comfortable viewing level.

c. Set SWEEP AFTER DELAY to AUTO and turn DELAY ㊼ clockwise until intensified portion of trace is over trace area to be investigated. This is demonstrated in figure 3-5.

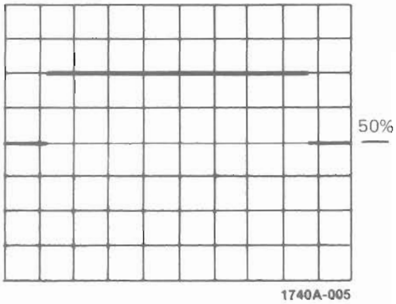


Figure 3-4. Magnified Display

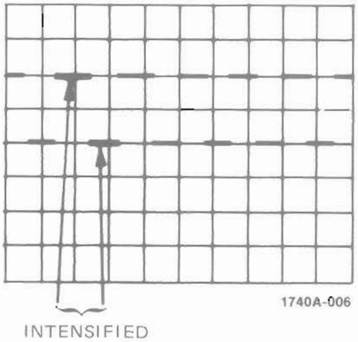


Figure 3-5. Normal Display with Intensified Area

d. Press DLY'D ㊽ and note that intensified portion of trace is now displayed across entire CRT (see figure 3-6).

e. DELAY ㊼ control may be adjusted to view other pulses in the pulse train.

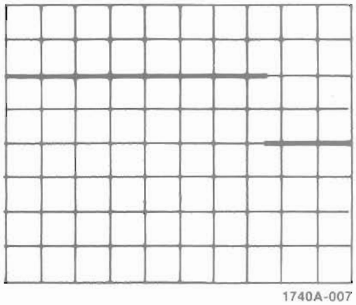


Figure 3-6. Delayed Sweep Display

3-18. MIXED SWEEP DISPLAY.

a. Perform paragraph 3-15 to obtain Normal Sweep Display.

b. Adjust delayed TIME/DIV ㉟ for 50 μSEC and note intensified portion of square wave. Set BEAM INTENSITY ④ to comfortable viewing level.

c. Turn DELAY ㊼ clockwise until part of waveform in second half of CRT is intensified (see figure 3-7).

d. Press MIXED ㊾ and observe that first portion of the display is at main TIME/DIV ㉞ sweep rate and second portion is at delayed TIME/DIV ㉟ sweep rate (see figure 3-8). The transition point from main sweep to delayed sweep can be varied by adjusting DELAY control ㊼.

SECTION IV

PRINCIPLES OF OPERATION

4-1. INTRODUCTION.

4-2. This section contains functional descriptions keyed to simplified block diagrams. The block diagrams are drawn for function and do not show circuit details. Schematics and an interconnection diagram are located in Section VIII.

4-3. VERTICAL SECTION BLOCK DIAGRAM. (Figure 4-1.)

4-4. **INPUT ATTENUATORS.** The attenuators have two functions: (1) they select the type of input coupling (50Ω, DC, GND, or AC), and (2) they determine the vertical deflection factor (5 mV/div to 20 V/div) as selected by the front-panel VOLTS/DIV switches. Only contact strips and their actuating cams are contained in the attenuator assemblies. The major part of each attenuator is on the preamplifier substrate. The only passive attenuation is a X100 section preceding the discrete, dual-FET impedance converter in each channel.

4-5. **VERTICAL PREAMPLIFIER.** The preamplifier substrate (A3A1) performs the necessary control functions for both channels A and B, including six dc-actuated ranges of attenuation per channel. Along with the X100 section, this configuration provides 12 calibrated levels of vertical sensitivity, ranging from 5 mV/div to 20 V/div. Peripheral circuitry includes control logic for the preamplifier substrate and a trigger-view amplifier, which routes signals from the external trigger input through the delay line and output amplifier.

4-6. **DELAY LINE.** The purpose of this assembly is to delay the vertical signal approximately 100 nanoseconds. This allows the sweep to trigger before the vertical signal reaches the CRT plates.

4-7. **VERTICAL OUTPUT AMPLIFIER.** The vertical output amplifier provides drive to the CRT vertical deflection plates.

4-8. HORIZONTAL SECTION BLOCK DIAGRAM. (Figure 4-1.)

4-9. **TRIGGER CIRCUIT.** The internal sync amplifier provides the signal for synchronization to the vertical signal. The set and trigger gates drive a current switch that starts the sweep. In the main AUTO mode, the bright-line auto circuit detects any absence of trigger signal and forces the main sweep to operate.

4-10. In delayed sweep, the main sweep and the DELAY potentiometer drive the delay comparator. When the comparator conducts, it enables the set and trigger gates for delayed sweep. In the AUTO SWEEP AFTER DELAY mode, the delayed sweep starts when the comparator conducts. In TRIG SWEEP AFTER DELAY, the delayed sweep will not conduct unless a trigger signal occurs after the trigger gates are enabled.

4-11. **SWEEP AND INTEGRATOR CIRCUITS.** The main and delayed sweep circuits initiate horizontal sweeps by the trigger signal applied to their inputs. Miller integrators produce the horizontal sweep ramps; their slopes are controlled by the front-panel TIME/DIV switches. The outputs from the Miller integrators are applied through the horizontal display mode switches to the horizontal preamplifier.

4-12. The horizontal sweep is also compared to a reference voltage by a ramp comparator that drives the reset circuit. The reset and holdoff circuits control the timing sequence of the sweep ramp.

4-13. **HOLDOFF CIRCUIT.** The holdoff circuit establishes a time interval at the end of the sweep that disables the trigger generator. The trigger generator is armed at the end of holdoff and is ready for the next trigger signal. The duration of holdoff is controlled by the TIME/DIV setting and the TRIGGER HOLDOFF control.

4-14. **HORIZONTAL PREAMPLIFIER.** The horizontal preamplifier provides amplification for the sweep ramp. The horizontal POSITION control establishes a reference level for the horizontal sweep. Trace magnification (X10) is also accomplished in this stage. When the BEAM FIND switch is pressed, the emitter current in the output stage of the preamplifier is reduced and the horizontal output stage cannot drive the beam beyond the viewing area of the CRT.

4-15. **HORIZONTAL OUTPUT.** The horizontal output stage provides drive to the CRT horizontal deflection plates.

4-16. GATE CIRCUITRY. (Figure 4-2.)

4-17. The gate amplifier assembly contains the circuitry necessary to control brightness of the CRT display. An intensity control circuit is used for brightening or blanking the CRT when necessary. BEAM FIND, and BEAM INTENSITY controls are part of the gate amplifier assembly.

4-18. HIGH-VOLTAGE POWER SUPPLY. (Figure 4-2.)

4-19. The high-voltage power supply consists of a high-voltage oscillator, a high voltage transformer, and a rectifying circuit. The high-voltage oscillator produces cathode, grid, and focus voltages for the CRT. A secondary winding on the high-voltage transformer provides voltage for the CRT cathode heater.

4-20. The rectified CRT cathode voltage is sampled and fed back to the high-voltage oscillator. Changes in cathode voltage are fed back to the high-voltage oscillator, causing the amplitude of its oscillation to change. The change corrects the rectified cathode voltage returning it to the normal operating value.

4-21. The unrectified cathode voltage in the secondary of the high-voltage transformer is applied to a multiplier assembly where it is multiplied four times. The multiplier output is connected to the CRT post-accelerator.

4-22. LOW-VOLTAGE POWER SUPPLY. (Figure 4-2.)

4-23. The low-voltage power supply operates from an ac power source. The ac line is applied to the input power circuit (100-, 120-, 220-, or 240-Vac operation is selectable). The input power circuit contains the ac line protection fuse. The ac input is applied to a step-down power transformer.

4-24. Secondary outputs from the power transformer are applied to rectifiers and voltage regulator circuits, which convert input ac power to usable dc outputs of different voltage levels.

4-25. CIRCUIT DETAILS.

4-26. The following paragraphs provide a detailed explanation of individual circuits in the Model 1740A. Circuits that are identical for both channels are explained for channel A only.

4-27. ATTENUATOR ASSEMBLIES. (Schematic 4.)

4-28. GENERAL INFORMATION. The channel A attenuator is a cam-actuated switch assembly. Only contact strips and their actuating cams are contained in the switch assembly. The contacts short appropriate pads on the preamplifier circuit board and only the first five (A1S1A-E), controlling the input coupling modes (AC, GND, DC, and 50Ω) and the X100 discrete attenuator, carry signal currents. The second five contacts (A1S1F-J) switch dc control voltages to the preamplifier substrate (A3A1) that switch attenuation on the substrate.

4-29. INPUT. The input signal applied to channel A INPUT connector J6 is routed through appropriate contacts A1S1A-E. With input coupling in the AC position (A1S1B closed; A1S1A, C open), the input signal is applied through capacitor A3C1 to the 1-megohm input section in the preamplifier. The value of A3C1 is such that signals below 10 Hz will be attenuated. In GND position (A1S1C closed; A1S1A, B open) the input signal is disconnected and the attenuator input is grounded through A3R1. In DC position (A1S1A, B closed; A1S1C open) a straight-through connection applies the input signal directly to the high impedance circuit of the attenuator. When input coupling is in the 50Ω position (A1S1A-C closed), the input signal is terminated in 50 ohms.

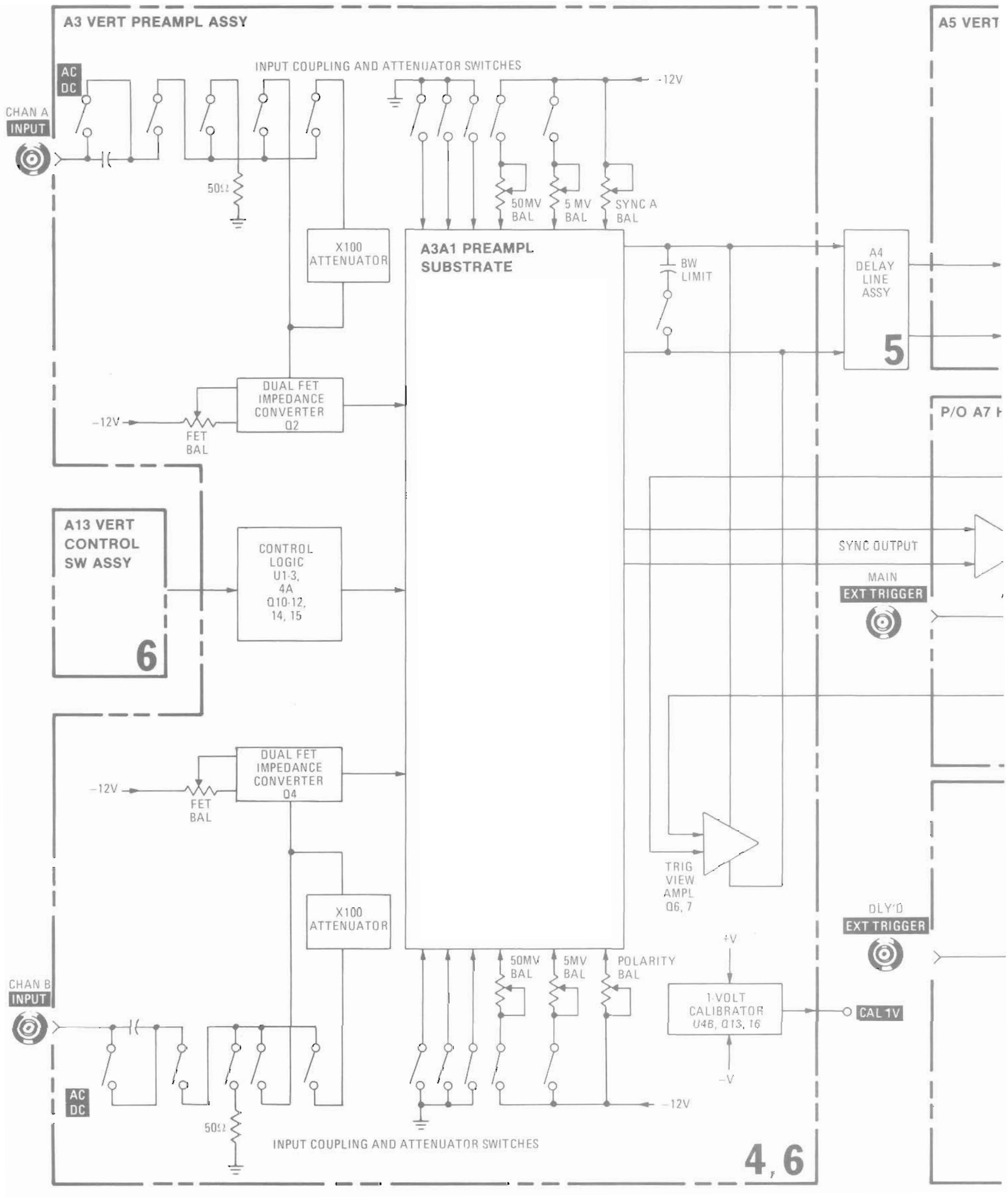
4-30. ATTENUATOR STAGES. The VOLTS/DIV switch activates various combinations of switch closures (A1S1D-J) to obtain the 12 calibrated ranges of vertical sensitivity from 5 mV/div to 20 V/div. The input attenuator has a X1 and a X100 position, and preamplifier substrate A3A1 has a X1 and X10 attenuator section followed by a second section providing a X1, X2, X4 attenuation sequence that repeats four times through the 12 ranges of vertical sensitivity. In the 5 mV/div VOLTS/DIV position, the input attenuator is in the X1 position and both attenuator sections in A3A1 are set to X1 attenuation. In the 10 mV/div and 20 mV/div positions, the second attenuator section in A3A1 steps to the X2 and X4 attenuation ranges respectively. In the 50 mV/div position, the second attenuator section reverts back to the initial X1 attenuation range, but the X10 attenuator in the first section of A3A1 is activated. For 100 mV/div and 200 mV/div, the second attenuator section again steps to the X2 and X4 attenuation ranges. The input attenuator is next switched to the X100 position for the remaining six ranges from 0.5 V/div to 20 V/div, and the sequence described for X1 input attenuation is repeated.

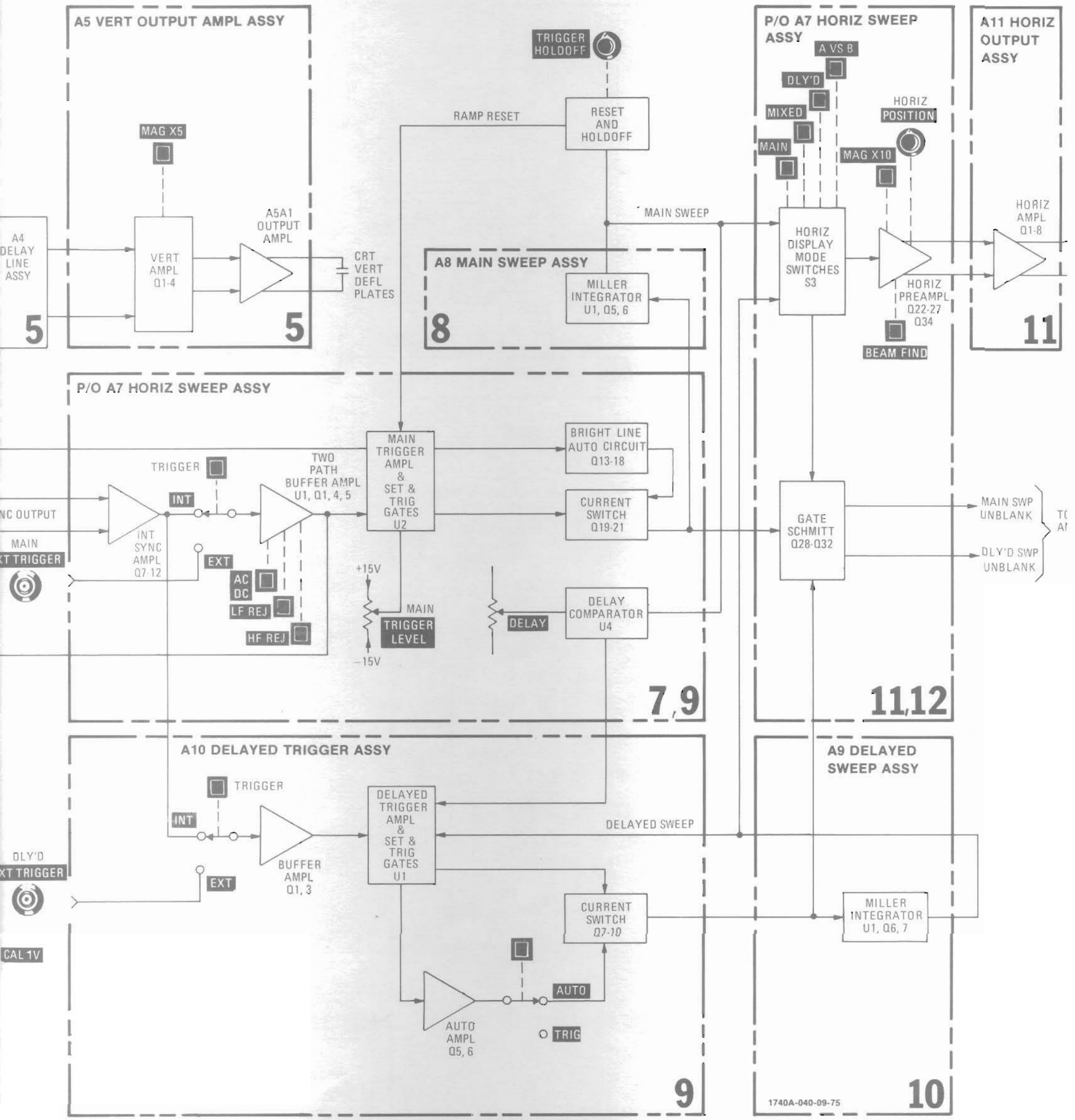
4-31. VERTICAL SECTION. (Schematics 4, 5, and 6.)

4-32. GENERAL INFORMATION. Signal conditioning is accomplished primarily by two substrates: preamplifier substrate (A3A1) and vertical output amplifier substrate (A5A1). The preamplifier substrate provides two pairs of differential outputs: the main vertical signal driving the delay line and the internal sync signal. The vertical output amplifier substrate provides the drive capability for the CRT vertical deflection plates.

4-33. PREAMPLIFIER STAGE. *Since channels A and B* are almost identical, only channel A will be described in detail. Where channel B differs from channel A, the difference will be discussed.

4-34. The input signal from the 1-megohm input section is applied to a high-to-low impedance converter stage consisting of a dual field-effect transistor (FET) A3Q2 connected in a source follower configuration. The second half of the FET, A3Q2B, provides a current bias for the source of A3Q2A. Because they


A3 VERT PREAMPL ASSY
AC
DC
CHAN A
INPUT
INPUT COUPLING AND ATTENUATOR SWITCHES
-12V
50Ω
50MV BAL
5 MV BAL
SYNC A BAL
X100 ATTENUATOR
A3A1 PREAMPL SUBSTRATE
BW LIMIT
A4 DELAY LINE ASSY
5
A5 VERT
DUAL FET IMPEDANCE CONVERTER Q2
-12V
FET BAL
P/O A7 H
A13 VERT CONTROL SW ASSY
6
CONTROL LOGIC U1-3, 4A Q10-12, 14, 15
SYNC OUTPUT
MAIN
EXT TRIGGER
DUAL FET IMPEDANCE CONVERTER Q4
-12V
FET BAL
TRIG VIEW AMPL Q6, 7
X100 ATTENUATOR
DLY'D
EXT TRIGGER
+V
50MV BAL
5MV BAL
POLARITY BAL
1-VOLT CALIBRATOR U4B, Q13, 16
CAL 1V
-V
CHAN B
INPUT
AC
DC
-12V
50Ω
INPUT COUPLING AND ATTENUATOR SWITCHES
4, 6


A5 VERT OUTPUT AMPL ASSY
MAG X5
A4 DELAY LINE ASSY
VERT AMPL Q1-4
A5A1 OUTPUT AMPL
CRT VERT DEFL PLATES
5
5
TRIGGER HOLDOFF
RAMP RESET
RESET AND HOLDOFF
MAIN SWEEP
A8 MAIN SWEEP ASSY
MILLER INTEGRATOR U1, Q5, 6
8
P/O A7 HORIZ SWEEP ASSY
A VS B
DLY'D
MIXED
MAIN
HORIZ POSITION
MAG X10
HORIZ DISPLAY MODE SWITCHES S3
HORIZ PREAMPL Q22-27 Q34
BEAM FIND
A11 HORIZ OUTPUT ASSY
HORIZ AMPL Q1-8
11
P/O A7 HORIZ SWEEP ASSY
TRIGGER
INT
NC OUTPUT
MAIN
XT TRIGGER
INT SYNC AMPL Q7-12
EXT
AC
DC
LF REJ
HF REJ
TWO PATH BUFFER AMPL U1, Q1, 4, 5
MAIN TRIGGER AMPL & SET & TRIG GATES U2
+15V
MAIN TRIGGER LEVEL
−15V
BRIGHT LINE AUTO CIRCUIT Q13-18
CURRENT SWITCH Q19-21
DELAY
DELAY COMPARATOR U4
GATE SCHMITT Q28-Q32
MAIN SWP UNBLANK
DLY'D SWP UNBLANK
TO AI
7,9
11,12
A10 DELAYED TRIGGER ASSY
TRIGGER
INT
DLY'D
XT TRIGGER
EXT
BUFFER AMPL Q1, 3
DELAYED TRIGGER AMPL & SET & TRIG GATES U1
DELAYED SWEEP
CURRENT SWITCH Q7-10
AUTO
AUTO AMPL Q5, 6
TRIG
CAL 1V
9
A9 DELAYED SWEEP ASSY
MILLER INTEGRATOR U1, Q6, 7
1740A-040-09-75
10

F
Vertical and Horizontal Block

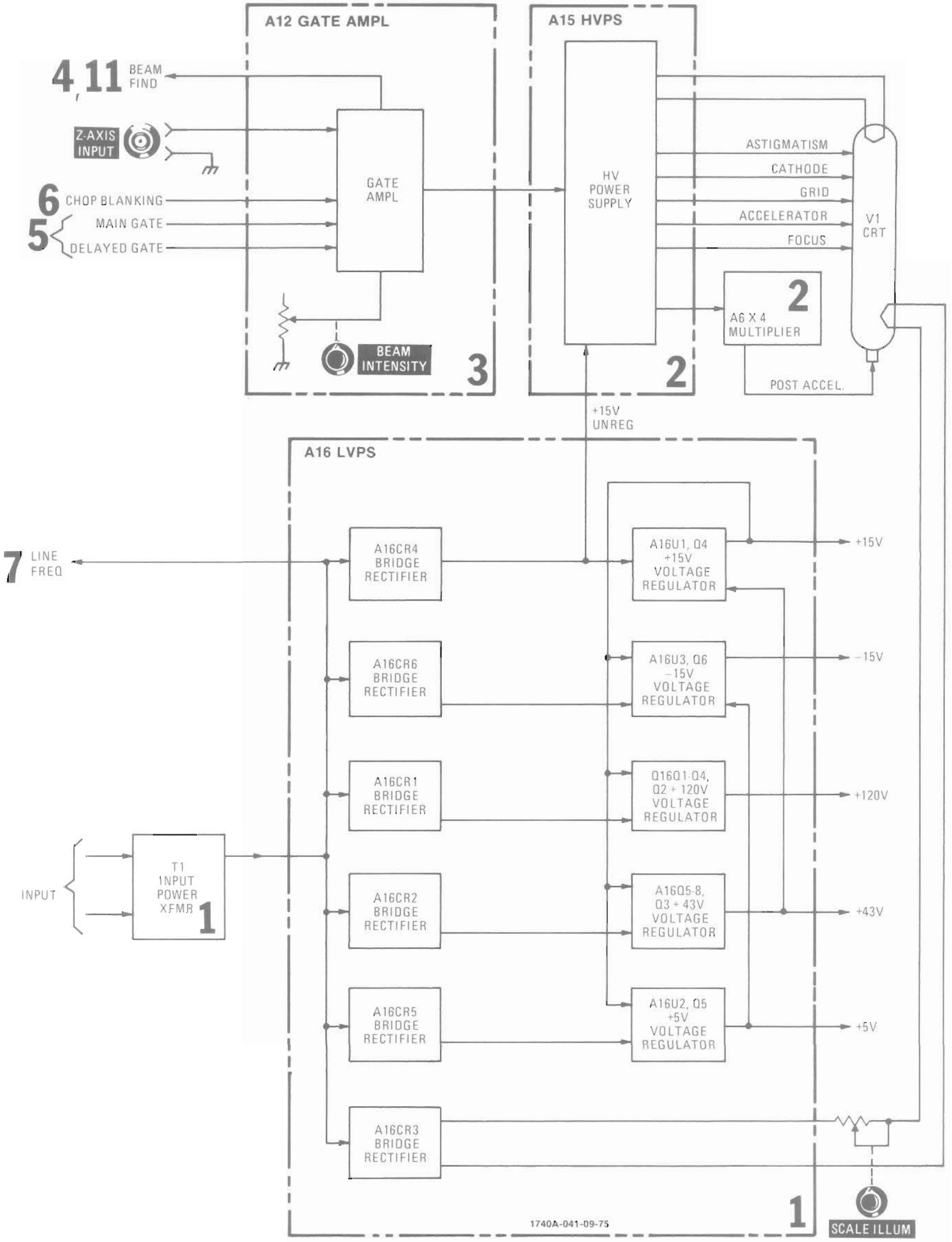

A12 GATE AMPL
A15 HVPS
4, 11
BEAM FIND
Z-AXIS INPUT
6
CHOP BLANKING
5
MAIN GATE
DELAYED GATE
GATE AMPL
HV POWER SUPPLY
ASTIGMATISM
CATHODE
GRID
ACCELERATOR
FOCUS
V1 CRT
2
A6 X 4 MULTIPLIER
POST ACCEL.
BEAM INTENSITY
3
2
+15V UNREG
A16 LVPS
7
LINE FREQ
A16CR4 BRIDGE RECTIFIER
A16U1, Q4 +15V VOLTAGE REGULATOR
+15V
A16CR6 BRIDGE RECTIFIER
A16U3, Q6 −15V VOLTAGE REGULATOR
−15V
A16CR1 BRIDGE RECTIFIER
Q16Q1-Q4, Q2 + 120V VOLTAGE REGULATOR
+120V
INPUT
T1 INPUT POWER XFMR
1
A16CR2 BRIDGE RECTIFIER
A16Q5-8, Q3 + 43V VOLTAGE REGULATOR
+43V
A16CR5 BRIDGE RECTIFIER
A16U2, Q5 +5V VOLTAGE REGULATOR
+5V
A16CR3 BRIDGE RECTIFIER
1740A-041-09-75
1
SCALE ILLUM

Figure 4-2. LVPS, HVPS, and Gate Amplifier Block Diagram

are a matched pair, the current changes due to temperature variation track. Therefore, the source voltage of A3Q2A will not vary substantially with temperature. The FET balance adjustment, A3R11, ensures a zero-volt input to pin 10 of A3A1, the channel A input.

4-35. The preamplifier substrate contains 31 thick-film resistors and three monolithic chips: channel A and B preamplifiers and a delay-line driver amplifier. Each of the preamplifier chips consists of 27 transistors, 23 diodes, and 34 monolithic resistors. These chips perform the conventional control functions of signal polarity, gain vernier, channel switching, and sync extraction; in addition, they control six ranges of vertical sensitivity. The gain chip is a four-transistor differential shunt-feedback amplifier that provides a current gain of eight and directly drives the balanced delay line.

4-36. The output of A3A1 is connected to delay line A4. The bandwidth limit circuit shunts the delay line input, and by switching the appropriate capacitance across the line limits the frequency response to approximately 20 MHz. Trigger view amplifier, A3Q6/A3Q7, also at the input of the delay line, routes signals from the external trigger input or from the vertical internal sync line through the delay line and Vertical Output Amplifier Assembly A5. In channel A or B DISPLAY, TRIG VIEW switch A3S1A replaces the main channel display with the triggering waveform. In ALT or CHOP, channel A, channel B, and the trigger signal are displayed.

4-37. When BEAM FIND switch A12S1 (schematic 3) is pressed, current is applied through A3CR4, A3CR5, A3CR6, and A3CR7 lowering sensitivity at the input to the delay line enough to return the trace to the viewing area of the CRT.

4-38. Each channel has a vertical POSN control (A3R61 and A3R36) operated from the front panel. Vertical positioning of the viewed display is accomplished in the appropriate preamplifier chip in A3A1 by differentially varying the bias current in the main signal path. This results in shifting the differential dc level of the vertical output plates and causes the trace on the CRT to move up or down.

4-39. The display of an input signal applied to channel B can be inverted by front-panel CH B INVT switch A3S1D. This function is accomplished by the channel B preamplifier chip in A3A1.

4-40. With front-panel vernier controls A1R1 and A2R1 out of the CAL position, the gain of each channel is continuously variable over at least a 2.5:1 range. These resistors control current ratios determining the gain of analog multiplier sections in each channel. The circuitry is contained on preamplifier chips in A3A1. Channel B has a vernier interface circuit, A3Q21, that allows A2R1 to control channel B gain in both normal and A VS B operation.

4-41. PREAMPLIFIER CONTROLS. (Schematic 6.) Vertical Control Switching Assembly A13 controls operation of substrate A3A1 on the vertical preamplifier as described in the following paragraphs.

4-42. Channel A Display. The channel A input signal is selected for display by pressing DISPLAY A switch A13S2B. Engaging A13S2B grounds the preset input (pin 4) of A3U2A, forcing Q high (pin 5). This state along with a high Q output (pin 5) from A3U4A Forces NAND gate A3U3C low (pin 8), which turns channel A on at pin 1 of A3A1. A voltage of 2.7 V at test point 7 indicates channel A is on; 4.7 V indicates channel A is off.

4-43. Channel B Display. The channel B input signal is selected for display by pressing DISPLAY B switch A13S2C. Engaging A13S2C grounds the clear input (pin 1) of A3U2A, forcing $\overline{Q}$ high (pin 6). This state is inverted by A3U3A (pin 3) to turn channel B on at pin 20 of A3A1. A voltage of 2.7 V at test point 5 indicates channel B is on; 4.7 V indicates channel B is off.

4-44. Channel A+B Display. To algebraically display input signals applied to both channels, DISPLAY switches A13S2B and A13S2C are pressed simultaneously; preset (pin 4) and clear (pin 1) inputs of A3U2A are grounded, forcing Q (pin 5) and $\overline{Q}$ (pin 6) outputs high. These states are inverted by A3U3A and A3U3C to force both channels on (2.7 V at test points 5 and 7).

4-45. ALT Mode Display. When ALT mode is selected by DISPLAY switch A13S2A, alternate control pulses correlated to the horizontal sweep are routed through the saturated transistor switch A3Q10 and emitter follower A3Q12 to the clock input (pin 3) of A3U2A. As A3U2A is switched by successive sweeps, channels A and B are turned on alternately.

4-46. CHOP Mode Display. When CHOP mode is selected by DISPLAY switch A13S1C, channels A and B are alternately switched on as they were for ALT display by A3U2A, except in CHOP mode the clock signal for A3U2A comes from chop oscillator A3U1B-D through saturated transistor switch A3Q11 and emitter follower A3Q12. The chop oscillator runs continuously at 500 kHz; therefore, a single channel cycles on and off at 250 kHz.

4-47. TRIG VIEW Mode Display. If either channel A or channel B display is chosen, pressing the TRIG VIEW switch A3S1A forces a low state on one input of NAND gates A3U3A and A3U3C. This condition ensures that both channels are off (4.7 V on test points 5 and 7). The $\overline{Q}$ output of A3U4A (pin 6) is forced high by a low input. This state switches on transistors A3Q8 and A3Q9, thereby turning on trigger view amplifier, A3Q6/A3Q7.

4-48. If ALT or CHOP modes are chosen, forced low states are removed from the inputs of A3U3A and

A3U3C and a divide by three counter, formed by A3U2A, A3U4A, and A3U3C, is switched by either the chop oscillator or alternate control line. In this manner, channel A, channel B, and the trigger signal are alternately switched on.

4-49. Channel A Sync Circuit. Vertical Control Switching Assembly A13 contains the sync control switches necessary for selective internal triggering.

4-50. Engaging TRIGGER A sync switch A13S1A grounds the preset input of A3U2B (pin 10), forcing Q high (pin 9). This state is inverted by A3U3D, placing a logic "0" on the channel A preamplifier sync control line (test point 8) through emitter follower A3Q14 to pin 13 on A3A1. Zero volts at test point 8 indicates sync A is on; 4.2 V indicates sync A is off.

4-51. Channel B Sync Circuit. Engaging the TRIGGER B Sync Switch, A13S1B, forces the clear input of A3U2B (pin 13) low causing $\overline{Q}$ (pin 8) to go high. This state is inverted by A3U3B, placing a low on the channel B preamplifier sync control line (test point 6) through emitter follower A3Q15 to pin 32 on A3A1. Zero volts at test point 6 indicates sync B is on; 4.2 V indicates sync B is off.

4-52. Composite Trigger Circuit. When composite trigger is selected, channel A and B sync switches, A13S1A and A13S1B, are pressed simultaneously. In A+B display mode low states appear on both clear (pin 13) and preset (pin 10) inputs of A3U2B forcing both Q (pin 9) and $\overline{Q}$ (pin 8) to their high states. This condition forces the sync control lines low through A3U3D, A3Q14, A3U3B, and A3Q15 to pins 13 and 32 on A3A1. With both sync paths on, the display is triggered by A+B. If channel B is inverted, sync B is also inverted. In ALT display mode, engaging A13S1A and A13S1B simultaneously removes preset and clear overrides from A3U2B and allows this flip-flop to switch from the alternate control signal generated in the horizontal section. This triggers channel A from the channel A signal and channel B from the channel B signal. If trigger view is also selected, triggering will change to channel A only. This is accomplished by grounding one input of A3U1A (pin 1). In CHOP mode, engaging A13S1A and A13S1B selects sync A only as the internal trigger source. Once again, pin 1 of A3U1A is grounded.

4-53. DELAY LINE ASSEMBLY. *The output of pre*-amplifier substrate A3A1 is applied to delay line assembly A4. The delay line has a differential impedance of approximately 180 ohms and provides a time delay of 100 nanoseconds which allows the internal sync signal to trigger the time base and start the horizontal sweep. Without the insertion of this time delay in the signal path, the sweep would start after the signal reached the vertical deflection plates of the CRT, and the leading edge of fast rise time signals would not be displayed.

4-54. VERTICAL OUTPUT AMPLIFIER. (Schematic 5.) Vertical output assembly A5 consists of a vertical amplifier and output amplifier substrate A5A1. Vertical amplifier A5Q1/A5Q3, terminates the differential delay line assembly A4 and translates the common-mode bias level to ground for the output amplifier substrate. A X5 magnifier, A5Q2 and A5Q4, increases the vertical gain by a factor of five, but with the bandwidth limited to approximately 40 MHz. Engaging MAG X5 switch A3S1B turns off A5Q2 and A5Q4 (normally saturated). This increases system gain by a factor of five and complementary circuitry on the preamplifier simultaneously diminishes position range by the same factor to maintain a consistent position control range.

4-55. Substrate A5A1 contains nine thick-film resistors, one high-frequency monolithic chip, and two discrete transistor chips. It provides drive capability for the CRT vertical deflection plates and has a differential voltage gain in excess of 100. High frequency adjustments A5R24, A5R20, A5R19, and A5R22 control the shape of the pulse response.

4-56. HORIZONTAL SECTION.

4-57. MAIN TRIGGER CIRCUITRY. (Schematic 7.) The internal sync signal developed on vertical preamplifier A3 is connected to the base of A7Q9 and A7Q10 through a cable. Shunt feedback stage A7Q11 drives emitter followers A7Q7, A7Q8, and A7Q12. The output of A7Q12 goes to display switch A7S3D and is used in the A VS B display mode. Transistor A7Q7 provides internal sync drive for main sweep, and A7Q8 provides internal sync drive for delayed sweep. When EXT trigger mode is selected, the input is from EXT TRIGGER connector J1 of the front panel. This signal is applied to INT/EXT switch A7S2E through EXT ÷ 10 switch A7S2F. When A7S2F is engaged, the external trigger signal is reduced by a factor of 10.

4-58. The sync signal (external or internal) is applied to a two-path amplifier. The high-frequency path through A7Q4 and A7Q5, passes frequencies above 4 kHz. The low-frequency path through A7U1, passes all frequencies below 4 kHz. Both the high- and low-frequency cutoffs are determined by A7R5 and A7C6. With the LF REJ switch A7S2B engaged, the input to A7U1 is disconnected and only the high-frequency path is enabled. With HF REJ switch A7S2C engaged, A7Q4 is biased off and only the low-frequency path is enabled. When AC/DC switch A7S2D is in its AC *position, the dc component of the trigger signal is* blocked. When both HF REJ and LF REJ are engaged, a line frequency signal from the power supply is applied to A7U1. The outputs of the two-path amplifier are summed at the base of A7Q1 and the emitter of A7Q1 drives the signal input (pin 14) of A7U2.

4-59. The trigger level signal is applied to the level input (pin 11) of A7U2 through A7Q6. Integrated circuit A7U2 contains a differential amplifier and three dual-input Schmitt triggers. The first Schmitt trigger determines the end of sweep and disables the other two Schmitt triggers until the end of the holdoff period. At the end of holdoff, the holdoff comparator develops a reset signal that is applied to the first Schmitt trigger. This arms the second Schmitt trigger. The second Schmitt trigger conducts when the input trigger signal crosses the trigger level threshold. This arms the third Schmitt trigger that conducts when the input signal recrosses the trigger level threshold.

4-60. The input sensitivity on which A7U2 generates a trigger signal is controlled by A7R20 and input sync signal slope is controlled by main slope switch A7S2A. A7S2A applies a ground to pin 16 for positive-slope triggering and +5 V for negative-slope triggering.

4-61. The output of A7U2 (pin 1) is applied to a three-transistor current switch (A7Q19, A7Q20, and A7Q21). When AUTO/NORM switch A7S1A is in NORM, the base of A7Q21 stays at +5 V and A7Q21 stays off. The bases of A7Q19 and A7Q20 are differentially driven from A7U2. The collector of A7Q19 going low starts the sweep. The complementary signal at the collector of A7Q20 enables the gate Schmitt (schematic 12) and turns the gate on. Current switch A7Q13/A7Q14 drives the RESET light and the bright-line auto circuit.

4-62. The bright-line auto circuit consists of A7Q15, A7Q16, A7Q17, and A7Q18. When the AUTO/NORM switch is in NORM, no bias is applied to the emitters of A7Q15, A7Q16, and A7Q17, and the bright-line auto circuit is inoperative. In the AUTO position, a bias is applied to these transistors and the bright-line auto circuit is activated. As long as the trigger circuit is being switched at a rate above 40 Hz, A7C13 will stay high and A7Q17 will remain off. When the trigger signal is lost, A7C13 discharges and A7Q17 turns on. As long as the trigger signal is absent, the bright-line auto circuit loop operates as follows. When A7Q17 turns on, A7Q21 turns on and main sweep starts. When the sweep reaches +11 volts, the reset Schmitt trigger on A7U2 conducts forcing pin 6 low. This turns on A7Q14 and A7Q15; A7Q17 and A7Q21 turn off and the sweep resets. The sweep stays reset until the end of holdoff. At the end of holdoff, pin 6 of A7U2 goes high, A7Q15 turns off and A7Q17 turns on starting another sweep. This completes the cycle and sweep continues in this mode until a trigger signal is present.

4-63. For single-sweep operation, SINGLE switch A7S1C is engaged. The SINGLE mode overrides the AUTO switch and also applies a bias signal of +4.7 volts to pin 5 of A7U2. This bias on pin 5 prevents the input Schmitt of A7U2 from resetting at the end of holdoff, and no trigger signal can be developed. The Schmitt does not reset until the RESET switch, A7S1B, is pressed. Capacitor A7C14 is at ground potential and pressing RESET momentarily pulls pin 5 of A7U2 low and resets the input Schmitt. A trigger signal can now be developed.

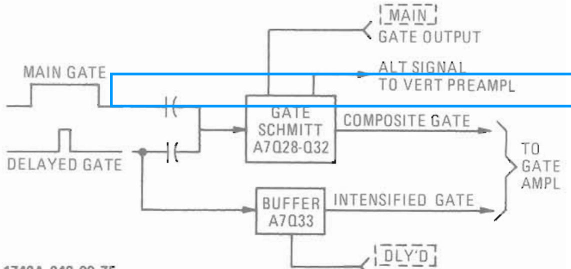
4-64. MAIN SWEEP AND INTEGRATOR. (Schematics 7, 8, and 9.) The main integrator, in conjunction with the sweep time controls, generates the main sweep. The Miller integrator circuit is comprised of current source A8Q13, source follower A8Q5, common-emitter stage A8Q6, and the integrating capacitor between the gate of A8Q5 and the collector of A8Q6. In the reset condition,current for A8Q13 is supplied through A8Q3. The main-sweep output stays at +1 volt. When a trigger signal is received, the base of A8Q1 goes low and A8Q1 turns on. This turns A8Q3 off. Current in A8Q13 is now supplied through the integrating capacitor resulting in a linear ramp at the collector of A8Q6. This ramp drives emitter followers A8Q8, A8Q9, and A8Q10. When the ramp reaches +11 volts, the emitter of A8Q10 is at +5 volts and A7U2 is set. This turns off A8Q1. With A8Q1 off, current from A8R7 flows through A8Q3 and discharges the selected integrating capacitor. When the voltage level at the base of A8Q4 falls to the voltage applied at the base of A8Q2, both A8Q2 and A8Q4 are conducting and the sum of the currents at the gate of A8Q5 is zero. This is the reset condition for the ramp.

4-65. The output of constant-current source A8Q13 is controlled by operational amplifier A8U1. Different reference voltages are developed for different ranges on TIME/DIV switch A8S1. The reference voltage is applied to A8U1 (pin 3). When different ranges are selected on the TIME/DIV switch, values of the ramp capacitor, integrating resistor, and reference voltage are changed. This changes the ramp slope for various sweep speeds. The ramp slope can be varied for any sweep speed by SWEEP VERNIER potentiometer R8.

4-66. The emitter of A8Q9 drives a particular holdoff capacitor (A8C13 through A8C18) depending on the position of TIME/DIV switch A8S1. At the end of the sweep, the holdoff capacitor is discharged through A8R40 and TRIGGER HOLDOFF potentiometer R9. When the voltage at the base of A8Q11 decays to +0.7 volts, A8Q12 turns on and the reset line to A7U2 (pin 4) goes low. This resets A7U2 so it can accept another trigger.

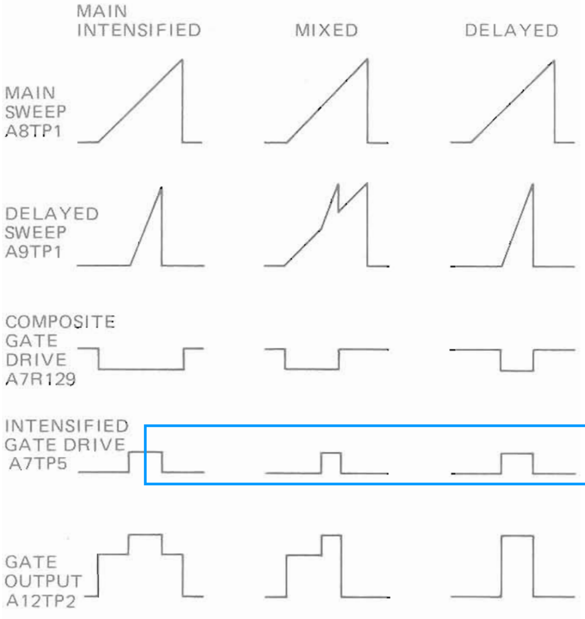
4-67. The positive-going ramp of the main sweep is also applied to pin 9 of delay comparator A7U4, which controls arming of the delayed sweep. DELAY potentiometer R6 establishes a reference voltage that is applied to buffer amplifier A7U3. The output of A7U3 drives pin 6 of A7U4. When the main sweep ramp voltage slightly exceeds the level established by R6, the comparator changes states. Its output arms the delayed-trigger circuit. When the delayed sweep switch is in the off position, A7U4 is inhibited at pin 13 and no delayed sweep can be generated.

4-68. The gate Schmitt circuit (see figure 4-3 and schematic 12) provides Gate Amplifier Assembly A12 with the proper input for each display mode. Gate Schmitt A7Q28 - A7Q32 is controlled by horizontal mode switch A7S3. It is set by the first positive control pulse and resets on the first negative control pulse. In main sweep operation, the gate follows the main sweep. In delayed operation, the gate follows the delayed sweep. In mixed operation, the gate is started by the main sweep and terminated by the end of delayed sweep. Figure 4-4 shows the timing relationship of the gate and sweep waveforms.



1740A-042-09-75

Figure 4-3. Gate Schmitt Simplified Block Diagram



1740A-043-07-76

Figure 4-4. Timing Relationship of the Gate and Sweep Waveforms

4-69. DELAYED TRIGGER OPERATION. (Schematic 9.) Delayed trigger operation is similar to main trigger operation. The sync input to delayed trigger integrated circuit A10U1 is supplied through an impedance converter consisting of an FET matched pair (A10Q1 and emitter follower A10Q3). Delayed sweep is started by a negative-going pulse at the collector of A10Q10. When SWEEP AFTER DELAY switch A10S1D is in AUTO position, this will occur as soon as A10U1 is armed at pin 5 by a negative-going pulse from delay comparator A7U4. In TRIG position, the negative-going transition from the delay comparator does not immediately cause delayed sweep to start. It arms A10U1 and a delayed trigger will be formed if a sync pulse occurs during the main sweep time.

4-70. DELAYED SWEEP. (Schematic 10). The operation of delayed sweep is similar to that of main sweep. One major difference is the delayed sweep reset level applied to the base of A9Q1. In the delayed mode of operation, this level is fixed at 1 volt, but in the mixed sweep mode of operation this reference is connected to the main sweep ramp. Output of the delayed integrator (TP1) follows the main sweep ramp until the delayed sweep start signal at the base of A9Q3 goes low. When this sweep start signal goes low, the delayed integrator no longer follows the reset level, but ramps up at a slope determined by the selected integrating capacitor and selected current source resistor.

4-71. HORIZONTAL DISPLAY SWITCH ASSEMBLY A7S3. (Schematics 7, 11, and 12.) The four switches in this assembly select the modes of horizontal display: delayed sweep, mixed sweep, main sweep, and A VS B display.

4-72. Delayed Sweep. The DLY'D sweep switch A7S3A performs two functions. When engaged, it reverse biases diode A7CR7 and prevents the main gate signal from driving the gate Schmitt. A7S3A also routes the delayed sweep ramp to the horizontal preamplifier.

4-73. Mixed Sweep. MIXED sweep switch A7S3B also performs two functions. When engaged, A7S3B applies the main sweep ramp as the reset reference to the delayed sweep integrator circuit. A7S3B also routes the delayed sweep ramp to the horizontal preamplifier.

4-74. Main Sweep. MAIN sweep switch A7S3C routes the main sweep ramp to the horizontal preamplifier.

4-75. A VS B Control. The A VS B switch A7S3D performs several functions. It sends a control signal to the vertical preamplifier which is used to select channel A vertical display and channel B sync. It biases the gate Schmitt to turn the gate on and forces the main trigger circuit to the single-shot mode. It also connects the sync amplifier output to the horizontal preamplifier.

4-76. HORIZONTAL PREAMPLIFIER. (Schematic 11.) The horizontal preamplifier converts the single-ended sweep or A VS B signal to a differential signal suitable for driving the horizontal output amplifier. The preamplifier provides sweep gain adjustment, sweep magnification adjustment (MAG X10), horizontal position, beam find control, and X10 magnification centering.

4-77. Transistor A7Q22 is a shunt feedback stage that level shifts the sweep ramp and drives differential amplifier A7Q23/A7Q27. Transistor A7Q26 is a shunt feedback stage that is used to temperature compensate A7Q22. Horizontal POSITION control R11 drives this stage. When MAG X10 switch A7S1D is engaged, current from mag-center potentiometer A7R105 also drives this stage. Current source transistor A7Q24 provides bias for shunt feedback stage A7Q22. Current source transistors A7Q25 and A7Q34 provide bias for the differential amplifier. The X1 sweep speed is calibrated by emitter resistor A7R93. MAG X10 control is calibrated by A7R117.

4-78. When BEAM FIND switch A12S1 is engaged, voltage at the bases of A7Q25 and A7Q34 is lowered. This decreases the amount of current available to the output stage and prevents it from driving the trace off screen.

4-79. HORIZONTAL OUTPUT. (Schematic 11.) The horizontal output is a differential shunt feedback amplifier. Current required by A7Q23 is supplied through A11R4. This determines the voltage driving one horizontal plate through A11R7. Current required by A7Q27 is supplied through A11R23 which determines the voltage driving the other horizontal plate through A11R21. Transistors A11Q1, A11Q2, A11Q5, and A11Q6 are emitter followers that provide a high impedance for each side of the output amplifier. High-speed linearity is controlled by a lag network at the input of each amplifier. Resistor A11R10 controls one side and A11R15 the other side. Each side of the output amplifier can swing from approximately +8 volts to +110 volts.

4-80. GATE AMPLIFIER ASSEMBLY A12. (Schematic 3.)

4-81. The gate amplifier assembly controls trace intensity on the CRT. Gate preamplifier A12U1 sums all the desired functions necessary for control of trace intensity (see figure 4-5 for a simplified block diagram of the gate circuit).

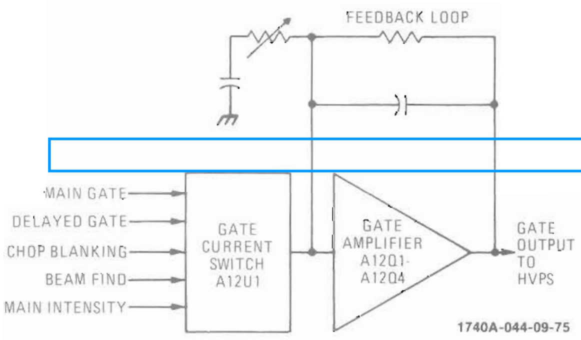


Figure 4-5. Gate Control Simplified Block Diagram

4-82. Front-panel BEAM INTENSITY control A12R3 establishes the level of current supplied to current switch A12U1Q1/A12U1Q2. Output of the current switch is applied to a gate amplifier circuit consisting of A12Q1 through A12Q4. Intensity adjustment A15R2 on the high-voltage power supply establishes the minimum cut-off level for the CRT.

4-83. The main gate signal is applied to the base of A12U1Q1 controlling its operation. When the main gate signal is low, A12U1Q1 turns off and A12U1Q2 conducts. With A12U1Q2 conducting, the CRT is unblanked. The same applies for the delayed gate signal which is applied to the base of A12U1Q5. When the delayed gate signal is high, A12U1Q5 conducts, unblanking the CRT.

4-84. Chop blanking is accomplished through A12U1Q3. When CHOP mode of operation is selected, the chop blanking signal applied to the base of A12U1Q3 turns it on and off. The alternating action of A12U1Q3 turns A12U1Q2 on and off. This results in the blanking and unblanking of the CRT at the chop blanking repetition rate (≈250 kHz).

4-85. A Z-axis signal of +4 V, pulse width ≥50 nanoseconds, dc to ≤10 MHz will blank the CRT trace of normal intensity. A Z-axis signal of +5 V (dc + pk ac) will blank the CRT trace regardless of intensity setting.

4-86. When BEAM FIND switch A12S1 is engaged, the setting of BEAM INTENSITY control A12R3 is added to a fixed voltage and supplied through the gate amplifier to the CRT. This causes intensification of the CRT trace.

4-87. The gate amplifier output is a shunt feedback stage consisting of A12Q1 through A12Q4. Transistors A12Q1 and A12Q3 are emitter followers with A12Q1 providing the ac signal path. Network A12R13/A12C8 provides the feedback path.

4-88. HIGH-VOLTAGE POWER SUPPLY. (Schematic 2.)

4-89. The high-voltage power supply contains an oscillator and a rectifying circuit. When the instrument is turned on, +15 volts (unregulated) is applied to pin 3 of A15U1 causing the output to go high, turning on Q1. As Q1 conducts through the primary winding of A15T1 (pins 3 and 4), positive feedback to the base of Q1 occurs through another winding on the transformer (pins 1 and 2). The circuit oscillates at a rate determined by the inherent distributed inductance and capacitance of the transformer. The magnitude of the oscillations, and consequently the output of the power supply, is controlled by the voltage at the output of differential amplifier A15U1.

4-90. The voltage reference from the +15 V supply is established at the junction of A15R22 and A15R23. This reference voltage is applied to the inverting input of amplifier A15U1. A sample of the rectified cathode voltage is also applied to the junction of

A15R22 and A15R23 through A15R13/C8. Any change in cathode voltage is amplified by A15U1. The change is coupled through the primary winding on A15T1 to the base of Q1 and causes the amplitude of its oscillations to change. The change is in such a direction as to correct the original change in the rectified cathode voltage. Diode A15CR1 protects the oscillator transistor base from excess reverse voltage.

4-91. The CRT cathode and grid voltages are developed in the secondary of high-voltage transformer A15T1. The cathode voltage is rectified and filtered before application to the cathode of the CRT. It is also used as a feedback control to the high-voltage oscillator, as a reference for the CRT filament winding, the grid bias supply, and for the focus voltage divider network. The cathode voltage will vary between —2970 V to —3030 V, depending on component tolerances of A15R13 and A15R22 and is not adjustable.

4-92. The CRT grid voltage is supplied by a voltage tap (pin 5) on the secondary winding of A15T1. The voltage is developed and applied through a series RC network (A15C2/A15R3) to diodes that clamp the voltage swing between that established by intensity control A15R2 and the gate dc levels. The peak-to-peak voltage swing is rectified and applied to the CRT grid with reference to the cathode voltage. This controls brightness of the trace.

4-93. The unrectified cathode voltage in the secondary of A15T1 is applied to multiplier assembly A6 where the voltage is multiplied four times. Output of the multiplier (approximately 13 kV) is applied to the post-accelerator connector on the CRT.

4-94. Another secondary winding of transformer A15T1 furnishes the filament voltage for the CRT. This winding is referenced to the rectified cathode voltage through A15R14.

4-95. Transistors A15Q1 and A15Q2 sense the +120 V supply and if it is not above 100 volts, the high-voltage oscillator will not run. This protects the CRT from high-intensity burns.

4-96. LOW-VOLTAGE POWER SUPPLY. (Schematic 1.)

4-97. The low-voltage power supply provides regulated +5 V, +15 V, +43 V, +120 V, and —15 V for operation of the various circuits in the instrument. All low voltage supplies are referenced to the +15 V supply for regulation purposes.

4-98. ±15-VOLT SUPPLIES. One of the secondary windings on input power transformer T1 is connected to bridge rectifier A16CR4. The rectified voltage (nominally +21 Vdc) is maintained at +15 volts by integrated circuit A16U1 and series regulator transistor Q4. Regulator A16U1 contains a temperature compensation reference circuit (pin 4) and a differential amplifier with a Darlington output. The reference circuit is connected to the noninverting input of the differential amplifier (pin 3) through A16R23. The +15-volt output is attenuated through A16R25-R27. The wiper of A16R26 is connected to the inverting input of the differential amplifier. The Darlington output (pin 6) drives the base of series transistor Q4. A16R26 is adjusted to compensate for variations of the reference voltage so that with an output of +15 volts from the supply, the inverting and noninverting input voltages are equal.

4-99. The IC regulation includes an output current limiting circuit consisting of an NPN transistor whose collector is connected to the differential amplifier and first base of the Darlington pair (within the IC). The emitter and base connections for the NPN transistor are pins 10 and 6 on A16U1. When load current through A16R24 produces a sufficient voltage drop, the NPN transistor conducts, pulling the input to the Darlington pair toward the emitter potential of Q4. This limits the output current.

4-100. The —15-volt supply, consisting of A16U3 and Q6, operates identically as the +15-volt supply except that the noninverting input to A16U3 (pin 3) is the sum of the +15 V and —15 V outputs (nominally zero volts).

4-101. +5-VOLT SUPPLY. The +5-volt regulator A16U2 functions identically to that of the +15 V regulator except that the reference voltage is provided by the output of the +15-volt supply and attenuated by A16R28 and A16R29.

4-102. +120-VOLT AND +43-VOLT POWER SUPPLIES. The +120-volt and +43-volt power supplies function identically; therefore, only the +120-volt supply will be discussed.

4-103. The ac input voltage from power transformer T1 is applied to bridge rectifier A16CR1. The dc output from the rectifier is filtered by A16C3. A +15-volt reference is applied through A16R1 to the base of A16Q1 which is part of differential amplifier A16Q1/Q2. The base of A16Q2 is connected to a voltage divider network across the output circuit. If the output falls below +120 V, the base of A16Q2 becomes less positive and A16Q2 conducts harder. A16Q2 is direct-coupled to Darlington pair A16Q4 and Q2. When A16Q2 current increases, conduction through A16Q4 and Q2 increases. This results in an increase in output voltage. When the output voltage reaches +120 volts, A16Q2 current reduces and equilibrium is reached. Transistor A16Q3 and resistor A16R2 form a current limiting circuit. As the current requirements increase towards the limit of the supply capability, the voltage drop across A16R2 is applied to the base of A16Q3 which conducts and limits the current drain from the Darlington pair.

4-104. The +43-volt power supply functions identically as the +120-volt supply. The Darlington pair consists of A16Q8 and Q3, and the current limiting circuit consists of A16Q7 and A16R10.

4-105. FLOODGUN FILAMENT VOLTAGE. Floodgun filament voltage is developed in a secondary winding of ac power transformer T1. The ac input voltage is rectified by A16CR3 and filtered by A16C7. The rectified voltage is applied through SCALE ILLUM potentiometer R12, (schematic 3) and dropping resistor A16R19 (schematic 1) to the floodgun filaments of the CRT. Potentiometer A16R20 adjusts the floodgun pattern.

4-106. LINE FREQUENCY. (Schematic 1.) The line frequency sync signal is developed in the same secondary winding of ac input power transformer T1 that is used for the +120-volt supply. The signal is applied through A16R40 to HF REJ switch A7S2C on assembly A7 (see schematic 7).

4-107. OPTION 101. (Schematic 14.)

4-108. Option 101 provides the capability of using the Model 1740A to present logic state display information from a logic state analyzer such as the HP Model 1607A. State display inputs are provided by input BNC connectors J8, J9, and J10 on the rear panel of the Model 1740A. With Option 101, the A VS B horizontal display mode is omitted and replaced by the state display mode pushbutton.

4-109. Option 101 incorporates the following changes to the standard Model 1740A:

a. The standard Interface Assembly A14 is replaced with Option 101 State Display Interface Assembly A14. Three wires from this assembly to the rear panel provide the inputs from the logic state analyzer. Two wires from A14 are soldered to the option inputs on Horizontal Sweep Assembly A7 (see schematic 11). Two more wires from A14 are soldered to Vertical Preamplifier Assembly A3 (see schematic 4).

b. Four diodes, A7CR17-A7CR20 are added to assembly A7.

c. Two resistors, A3R142 and A3R143, are added to assembly A3, and A3CR25 is moved to a new position on A3 (see schematic 4). Components A3C77, A3CR28, A3CR29, A3Q21, A3R139, and A3R140, which are associated with A VS B vernier control, are omitted from assembly A3 for Option 101.

4-110. When the STATE DSPL button is engaged, switch A7S3D (labeled A—B on schematics) performs the following functions. The main sweep is forced to single sweep. The horizontal preamplifier is disabled. Channels A and B of the vertical preamplifier are shut off. The trigger view amplifier is turned on. The gate Schmitt on assembly A7 is forced on, and control of the gate is from the rear panel Z-axis input J8.

4-111. Option 101 circuits on assembly A14 operate as follows. The gate is blanked by a positive signal on the rear-panel, Z-axis input from the Model 1607A Logic State Analyzer. When the state display mode is selected, the line labeled A—B control on the interface board is forced to ground, turning A14Q1 off. When the Z-axis input goes positive, the cathode of A14CR4, which drives the chop blanking line, goes positive and blanks the gate.

4-112. Differential amplifier A14Q4/A14Q5 amplifies the horizontal input from J10 on the rear panel and drives Horizontal Output Assembly A11 through diodes A7CR19 and A7CR20. The A—B ground level signal on the anodes of A14CR7 and A14CR8 back bias the diodes and permit the differential amplifier, A14Q4 and A14Q5, to drive the output stage.

4-113. Differential amplifier A14Q2/A14Q3 amplifies the vertical input from J10 on the rear panel. The A—B ground level signal turns off A14CR5 and A14CR6 and enables this differential amplifier. The collectors of A14Q2 and A14Q3 drive A3R142 and A3R143. The trigger view amplifier is enabled in this mode and the vertical state display signal drives the delay line through the trigger view amplifier. Gain and position of the vertical and horizontal sections are controlled from the logic state analyzer.

SECTION V

PERFORMANCE TESTS AND ADJUSTMENTS

5-1. INTRODUCTION.

5-2. This section contains performance tests and adjustment procedures for the Model 1740A Oscilloscope. The performance tests determine whether your instrument is operating within its published specifications. The adjustment procedures are provided to help you maintain your instrument within specification limits.

5-3. RECOMMENDED TEST EQUIPMENT.

5-4. Test equipment required for the performance tests and adjustment procedures is listed in table 5-1. Any equipment that satisfies the critical specifications given in the table may be substituted for the recommended model.

5-5. TEST RECORD.

5-6. A Performance Test Record is provided at the end of this section for the purpose of recording the results of the Performance Tests. This record lists all of the tested specifications and their acceptable limits. This record can be removed from the manual and retained as a permanent record of the incoming inspection or routine maintenance performed on the instrument. This record may be reproduced for your use without special permission.

5-7. PERFORMANCE TESTS.

5-8. Use the following test procedures to determine whether your instrument is operating within its published specifications. The test limits given in the accuracy tests and on the performance test record compare the instrument to the published specifications. The performance of the instrument should be tested upon receipt, and at regular intervals determined by your accuracy requirements. If the 1740A fails to meet one or more of its specifications, refer to the Adjustment Procedures, paragraph 5-36. The 1740A and test equipment should be operated at normal line voltage, with the 1740A line selector switch set to the correct positions for corresponding input line voltage.

5-9. INITIAL CONTROL SETTINGS.

5-10. The control settings listed below must be used for each performance check and adjustment procedure. Exceptions to these settings will be noted as they occur. After completing a check or adjustment, return the Model 1740A controls to the following settings:

CONTROL	SETTING
All Pushbuttons (except as noted below)	out position
VOLTS/DIV (Channels A and B)	.1
CAL (Channels A and B)	detent (full cw)
Coupling (Channels A and B)	DC
POSN (Channels A and B)	midrange
DISPLAY	A
TRIGGER	A
FOCUS	best trace
BEAM INTENSITY	10 – 11 o'clock
LINE	ON
POSITION	midrange
TRIGGER LEVEL (Main and Delayed)	3 o'clock
Sweep Mode	MAIN
DELAY	fully CCW
MAIN TIME/DIV	.1 mSEC
DLY'D TIME/DIV	OFF
SWEEP VERNIER	CAL
TRIGGER HOLDOFF	MIN

5-11. PERFORMANCE TEST PROCEDURES.

5-12. BANDWIDTH. 3 dB down from an 6-division reference signal; dc to 100 MHz, dc coupled; and 10 Hz to 100 MHz, ac coupled. In the vertical MAG X5 mode, bandwidth is reduced to 40 MHz.

5-13. A signal generator is used to provide the reference signal. An rf voltmeter is used to monitor the signal level at the input connector to verify that the signal amplitude remains constant.

Equipment Required:

- Signal Generator
- RF Voltmeter
- BNC Cable (48 inch)
- BNC Tee
- Adapter (GR874 to Male BNC)
- Adapter (GR874 to Female BNC)

5-14. Perform bandwidth test as follows:

a. Connect signal generator and rf voltmeter as shown in figure 5-1.

b. Set Model 1740A controls as follows:

Coupling (both channels)	50Ω
Channel A VOLTS/DIV	0.01
MAIN TIME/DIV	1 μSEC

Table 5-1. Recommended Test Equipment

Instrument Type	Recommended Model	Required Characteristics	Required For
Digital Voltmeter	HP Model 3465A	Accuracy: 0.1%	A
Oscilloscope	HP Model 1707B	Bandwidth: 50 MHz 10:1 divider probe	A
Oscillator	HP Model 204C	1 kHz to 500 kHz, 1 V p-p	A
Signal Generator	HP Model 3200B	100 MHz, 30 mV p-p	P, A
Time-mark Generator	HP Model 226A	Time Marks 2 s to 5 ns	P, A
LCR Meter	HP Model 4332A	20 pF range	A
Square-wave Generator	HP Model 211B	10-kHz square wave 3 V pk	A
Fast-rise Pulse Generator		Rise time: less than 500 ps 50-ohm output Variable amplitude Overshoot less than 3%	P, A
DC Standard	HP Model 740B	40 mV to 160 V Accuracy: 0.1%	P, A
RF Voltmeter	HP Model 3406A with 11063A 50-ohm Tee		P
Adapter	HP Part No. 1251-2277	Male banana jack to female BNC adapter	P, A
Adapter (3)	HP Part No. 1250-0850	GR874 to female BNC	P, A
48-inch BNC Cable	HP Model 10503A	50-ohm, BNC male to BNC male, approximately 48 inches long	P, A
9-inch BNC Cables (2)	HP Model 10502A	50-ohm, BNC male to BNC male, approximately 9 inches long (must be equal length)	P, A
Power Divider	General Radio Model 874-TPD	50 ohms at all connections	P, A
BNC Tee	HP Part No. 1250-0781	1 male, 2 female	A
Adapter	HP Part No. 1250-1264	Female banana jack to male BNC adapter	P
Adapter	HP Part No. 1250-0849	GR874 to male BNC	P

Table 5-1. Recommended Test Equipment (Cont'd)

Instrument Type	Recommended Model	Required Characteristics	Required For
Feedthrough Termination	HP Model 10100C	50-ohm, male BNC at one end, female BNC at other end	P
Test Lead		Alligator to male banana or alligator to alligator, approximately 12 inches long	A

Note: P = Performance Tests, A= Adjustment Procedure.

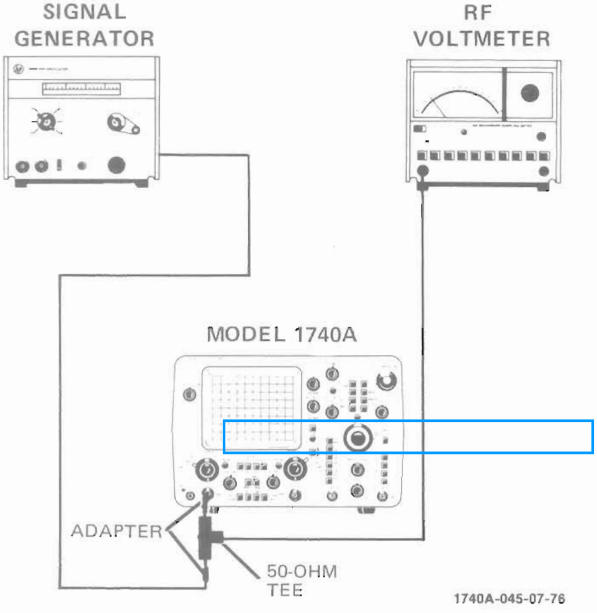

SIGNAL GENERATOR
RF VOLTMETER
MODEL 1740A
ADAPTER
50-OHM TEE
1740A-045-07-76

Figure 5-1. Bandwidth Test Setup

c. Set signal generator frequency for approximately 10 MHz with exactly 6 divisions of vertical deflection on oscilloscope.

d. Note rf voltmeter indication.

e. Set signal generator frequency to 100 MHz.

f. Adjust signal generator amplitude to obtain same indication as in step d. Amplitude of display should be equal to or greater than 4.24 divisions.

g. Set Model 1740A controls as follows:

DISPLAY	B
TRIGGER	B

h. Connect signal generator to channel B INPUT and repeat steps b through f for channel B.

i. Disconnect equipment and return Model 1740A controls to initial settings.

5-15. COMMON MODE REJECTION RATIO (CMRR). CMRR is at least 20 dB from dc to 20 MHz. Common mode signal amplitude is equivalent to 8 cm with one vernier adjusted for optimum rejection. Identical signals are applied to both channels with channel B operated in the inverted mode. The displayed signal is the common mode signal.

Equipment Required:

Signal Generator
50-ohm, 44-inch BNC Cable
Two 50-ohm, 9-inch BNC Cables
Three GR874 to Female BNC Adapters
50-ohm Power Divider

5-16. Perform CMRR test as follows:

a. Connect equipment as shown in figure 5-2.

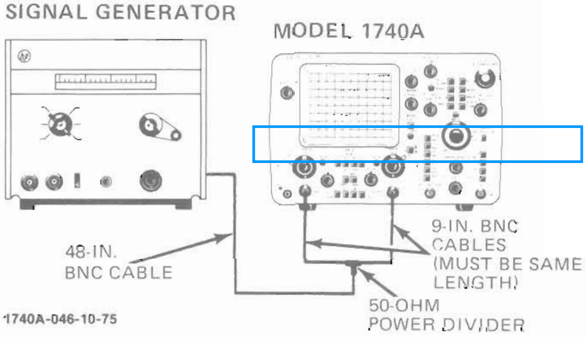

SIGNAL GENERATOR
MODEL 1740A
9-IN. BNC CABLES (MUST BE SAME LENGTH)
48-IN. BNC CABLE
50-OHM POWER DIVIDER
1740A-046-10-75

Figure 5-2. CMRR Test Setup

b. Set Model 1740A controls as follows:

VOLTS/DIV (both channels)	.1
DISPLAY	A
MAIN TIME/DIV	1 μSEC
Coupling (both channels)	50Ω

c. Set signal generator controls to observe a 20-MHz signal, 8 divisions in amplitude.

d. Set Model 1740A controls as follows:

CH B INVT	engaged
DISPLAY	A + B

e. Adjust either channel vernier (whichever is most effective) to achieve minimum deflection.

f. Deflection should be less than 0.8 division (20 dB).

g. Return Model 1740A controls to initial settings and disconnect equipment.

5-17. TRIGGERING.

5-18. Internal Triggering. DC to 25 MHz on signals causing 0.3 division vertical deflection increasing to 1 division at 100 MHz. The output of a signal generator is applied to the vertical input to check internal triggering.

Equipment Required:

Signal Generator
50-ohm, 48-inch BNC Cable

5-19. Perform the internal triggering check as follows:

a. Connect signal generator to channel A INPUT.

b. Set signal generator controls to obtain a 25-MHz signal with 0.3-division amplitude.

c. Set Model 1740A controls as follows:

Channel A Coupling	50Ω
MAIN TIME/DIV	.05 μSEC

d. Adjust main TRIGGER LEVEL to obtain stable display. Stable display confirms proper triggering.

e. Change signal generator controls to obtain a 1-division signal at 100 MHz.

f. Readjust main TRIGGER LEVEL to obtain stable display. Stable display confirms proper triggering.

g. Change Model 1740A controls as follows:

MAIN TIME/DIV	.1 μSEC
DELAYED TIME/DIV	.05 μSEC
SWEEP AFTER DELAY	TRIG
Sweep Display	DLY'D

h. Adjust delayed TRIGGER LEVEL to obtain stable display (slight readjustment of main TRIGGER LEVEL may be required).

i. Change signal generator output to 0.3-division amplitude at 25 MHz.

j. Readjust delayed TRIGGER LEVEL (and main TRIGGER LEVEL if necessary) to obtain stable display.

k. Return Model 1740A controls to initial settings.

5-20. External Triggering. DC to 50 MHz on signals 50 mV p-p, increasing to 100 mV p-p at 100 MHz. The output of a signal generator is split using a power divider, and equal amplitude signals are applied to both channel A and the main EXT TRIGGER INPUT to check external triggering.

Equipment Required:

Signal Generator
50-ohm, 48-inch BNC Cable
Two 50-ohm, 9-inch BNC Cables
Three GR874 to Female BNC Adapters
50-ohm Feed through Termination
50-ohm Power Divider

5-21. Perform external triggering test as follows:

a. Connect equipment as shown in figure 5-3.

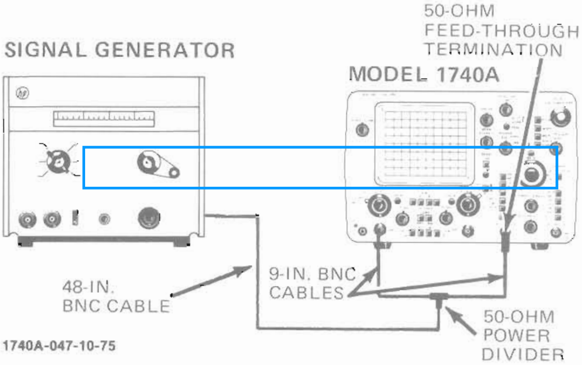


Figure 5-3. External Triggering Test Setup

b. Set Model 1740A controls as follows:

Channel A VOLTS/DIV	.05
Channel A Coupling	50Ω
MAIN TIME/DIV	.1 μSEC
MAG X10	engaged
Main INT/EXT	EXT

c. Set signal generator controls to obtain a 50-MHz, 50-mV p-p signal (1 division).

d. Adjust main TRIGGER LEVEL to obtain stable display.

e. Set signal generator controls to obtain a 100-MHz, 100-mV p-p signal (2 divisions).

f. Adjust main TRIGGER LEVEL to obtain stable triggering.

g. Set Model 1740A controls as follows:

Main INT/EXT	INT
Delayed INT/EXT	EXT
SWEEP AFTER DELAY	TRIG
Delayed TIME/DIV	.05 μSEC
Sweep Display	DLY'D

h. Disconnect signal from main EXT TRIGGER and reconnect to delayed EXT TRIGGER input.

i. Adjust delayed TRIGGER LEVEL to obtain stable display (main TRIGGER LEVEL may also require adjustment).

j. Set signal generator controls to obtain a 50-MHz, 50-mV p-p signal.

k. Adjust TRIGGER LEVEL(S) as necessary to obtain stable triggering.

l. Return Model 1740A controls to initial settings and disconnect equipment.

5-22. SWEEP TIME ACCURACY. (+15°C to +35°C) ±2% in unmagnified mode and ±3% in MAG X10 mode. Refer to table 1-1 for other variations in ambient temperatures. In 50 ms to 2 s ranges, add 1% error.

Equipment Required:

Time-mark Generator
50-ohm, 48-inch BNC Cable

5-23. Perform sweep time accuracy test as follows:

a. Connect time-mark generator to channel A INPUT.

b. Set time-mark generator and main TIME/DIV controls as shown in table 5-2 and check accuracy as indicated.

c. Change Model 1740A sweep display to DLY'D.

d. Set main and delayed TIME/DIV controls as indicated in table 5-3 and check accuracy. It may be necessary to make a minor adjustment of DELAY control to align markers with graticule lines.

e. Return Model 1740A controls to initial settings.

Table 5-2. Main TIME/DIV Accuracy

Main TIME/DIV Setting	Time-mark Generator Settings	Accuracy X1	Accuracy X10
.05 μSEC	50 nSEC	1 mark/div ±2%	±3%
.1 μSEC	.1 μSEC	1 mark/div ±2%	±3%
.2 μSEC	.2 μSEC	1 mark/div ±2%	±3%
.5 μSEC	.5 μSEC	1 mark/div ±2%	±3%
1 μSEC	1 μSEC	1 mark/div ±2%	±3%
2 μSEC	2 μSEC	1 mark/div ±2%	±3%
5 μSEC	5 μSEC	1 mark/div ±2%	±3%
10 μSEC	10 μSEC	1 mark/div ±2%	±3%
20 μSEC	20 μSEC	1 mark/div ±2%	±3%
50 μSEC	50 μSEC	1 mark/div ±2%	±3%
.1 mSEC	.1 mSEC	1 mark/div ±2%	±3%
.2 mSEC	.2 mSEC	1 mark/div ±2%	±3%
.5 mSEC	.5 mSEC	1 mark/div ±2%	±3%
1 mSEC	1 mSEC	1 mark/div ±2%	±3%
2 mSEC	2 mSEC	1 mark/div ±2%	±3%
5 mSEC	5 mSEC	1 mark/div ±2%	±3%
10 mSEC	10 mSEC	1 mark/div ±2%	±3%
20 mSEC	20 mSEC	1 mark/div ±2%	±3%
50 mSEC	50 mSEC	1 mark/div ±3%	±4%
.1 SEC	.1 SEC	1 mark/div ±3%	±4%
.2 SEC	.2 SEC	1 mark/div ±3%	±4%
.5 SEC	.5 SEC	1 mark/div ±3%	±4%
1 SEC	1 SEC	1 mark/div ±3%	±4%
2 SEC	2 SEC	1 mark/div ±3%	±4%

Table 5-3. Delayed TIME/DIV Accuracy

Main TIME/DIV Settings	Delayed TIME/DIV Settings	Time-mark Generator Settings	Accuracy	
			X1	X10
.1 μSEC	.05 μSEC	50 nSEC	1 mark/div ±2%	1 mark/div ±3%
.2 μSEC	.1 μSEC	.1 μSEC	1 mard/div ±2%	1 mark/div ±3%
.5 μSEC	.2 μsEC	.2 μSEC	1 mark/div ±2%	1 mark/div ±3%
1 μSEC	.5 μSEC	.5 μSEC	1 mark/div ±2%	1 mark/div ±3%
2 μSEC	1 μSEC	1 μSEC	1 mark/div ±2%	1 mark/div ±3%
5 μSEC	2 μSEC	2 μSEC	1 mark/div ±2%	1 mark/div ±3%
10 μSEC	5 μSEC	5 μSEC	1 mark/div ±2%	1 Mark/div ±3%
20 μSEC	10 μSEC	10 μSEC	1 mark/div ±2%	1 mark/div ±3%
50 μSEC	20 μSEC	20 μSEC	1 mark/div ±2%	1 mark/div ±3%
.1 mSEC	50 μSEC	50 μSEC	1 mark/div ±2%	1 mark/div ±2%
.2 mSEC	.1 mSEC	.1 mSEC	1 mark/div ±2%	1 mark/div ±3%
.5 mSEC	.2 mSEC	.2 mSEC	1 mark/div ±2%	1 mark/div ±3%
1 mSEC	.5 mSEC	.5 mSEC	1 mark/div ±2%	1 mark/div ±3%
2 mSEC	1 mSEC	1 mSEC	1 mark/div ±2%	1 mark/div ±3%
5 mSEC	2 mSEC	2 mSEC	1 mark/duv ±2%	1 mark/div ±3%
10 mSEC	5 mSEC	5 mSEC	1 mark/div ±2%	1 mark/div ±3%
20 mSEC	10 mSEC	10 mSEC	1 mark/div ±2%	1 mark/div ±3%
50 mSEC	20 mSEC	20 mSEC	1 mark/div ±2%	1 mark/div ±3%

5-24. DIFFERENTIAL TIME ACCURACY. Main time base: 100 nSEC/div to 20 mSEC/div, ±(0.5% of measurement + 0.1% of full scale) at ambient temperature of +15°C to +35°C. Refer to table 1-1 for complete specifications. A time-mark generator is used in delayed sweep mode to check accuracy.

Equipment Required:

Time-mark Generator
50-ohm, 48-inch BNC Cable

5-25. Perform differential time accuracy test as follows:

a. Connect time-mark generator to Channel A INPUT.

b. Set Model 1740A controls as follows:

Main TIME/DIV .... 1 mSEC
Delayed TIME/DIV .... 10 μSEC
Channel A Coupling 50Ω

c. Set time-mark generator for 1 mSEC marker.

d. Adjust DELAY dial to intensify second time marker from left.

e. Set sweep display to DLY'D.

f. Adjust DELAY dial to place visible time markers exactly on center vertical graticule line.

g. Record DELAY dial reading ______________.

h. Set sweep display to MAIN.

i. Adjust DELAY dial to intensity 10th time marker from left.

j. Set sweep display to DLY'D.

k. Adjust DELAY dial to place visible time marker exactly on center vertical graticule line.

l. Record DELAY dial reading ______________.

m. Subtract DELAY dial reading obtained in step g from reading in step l, difference obtained should be 8 ±0.05.

n. Return Model 1740A controls to initial settings.

5-26. DELAY JITTER. <0.002% (1 part in 50 000) of maximum delay in each step from +15°C to +35°C. Delay jitter is checked by expanding the sweep by 50 000 and visually monitoring the jitter.

Equipment Required:

Time-mark Generator
50-ohm, 48-inch BNC Cable

5-27. Perform delay jitter test as follows:

a. Connect time-mark generator to channel A INPUT (1 mSEC markers).

b. Set Model 1740A controls as follows:

Main TIME/DIV .... 1 mSEC
Delayed TIME/DIV .... .2 μSEC
Channel A VOLTS/DIV 5
Channel A Coupling 50Ω

c. Adjust DELAY dial to position intensified portion of sweep on 11th time marker.

d. Set sweep display to DLY'D, and observe horizontal axis jitter on time marker. Jitter should be less than 1 division (corresponds to 1:50 000).

e. Return Model 1740A to initial settings and disconnect equipment.

5-28. RISE TIME. ≤3.5 ns, measured from 10% to 90% points of a 6-division input step, and ≤9 ns in X5 vertical magnification mode. A fast-rise pulse generator is applied to the vertical input; display rise time is then checked to see if it is less than 3.5 ns.

Equipment Required:

Fast-rise pulse generator
Adapter: GR874 to male BNC

5-29. Perform rise time test as follows:

a. Connect fast-rise pulse generator to channel A INPUT.

b. Set channel A VOLTS/DIV and pulse generator controls to obtain 6 divisions of vertical deflection.

c. Using channel A POSN control, center 6-division display on CRT.

d. Set Model 1740A controls as follows:

MAIN TIME/DIV	.05 μSEC
MAG X10	engaged
Channel A Coupling	50Ω

e. Adjust horizontal POSITION as necessary to measure rise time between 10% and 90% points (inner set of dots across CRT face). Rise time should be equal to or less than 3.5 ns.

NOTE

If the fast-rise pulse generator has a rise time slower than the recommended 500 ps, the observed rise time will be slower also. To compensate for pulse generator rise time, use the following formula:

$$T_r(\text{observed}) = \sqrt{T_r^2(\text{oscilloscope}) + T_r^2(\text{pulse generator})}$$

or

$$T_r(\text{oscilloscope}) = \sqrt{T_r^2(\text{observed}) - T_r^2(\text{pulse generator})}$$

For example, a pulse generator with a 2 ns rise time would cause a properly operating oscilloscope with a rise time of 3.5 ns to display a rise time of 4.03 ns.

$$T_r\ (\text{observed}) = \sqrt{3.5^2 + 2^2} = 4.03\ \text{ns}$$

f. Depress vertical MAG X5 switch.

g. Reset channel A VOLTS/DIV and pulse generator controls to obtain an 8-division display.

h. Center display on CRT. Rise time should be equal to or less than 9 ns.

i. Connect the fast-rise pulse generator to channel B input and repeat steps b through h for channel B.

j. Return Model 1740A controls to initial settings and disconnect equipment.

5-30. Z-AXIS BLANKING. +4V, ≥50-ns wide pulse blanks trace of any intensity, usable to 10 MHz for normal intensity. +4 V signal is applied to the Z-axis input and the CRT is monitored to verify blanking.

Equipment Required:

Dc Standard
50-ohm, 48-inch BNC Cable
Adapter: male banana jack to female BNC

5-31. Perform blanking test as follows:

a. Connect voltmeter calibrator to Z-AXIS INPUT on rear panel.

b. Set voltmeter for +4 Vdc.

c. Verify that the free-running baseline is blanked, regardless of INTENSITY setting.

5-32. DEFLECTION FACTOR. Accuracy ±3% on all ranges. A voltmeter calibrator or dc power supply is connected to the vertical inputs and deflection is checked on all ranges.

Equipment Required:

Dc Standard
50-ohm, 48-inch BNC Cable
Adapter: male banana jack to female BNC

5-33. Perform deflection factor test as follows:

a. Connect dc standard to channel A INPUT.

b. Set channel A VOLTS/DIV control and dc standard as indicated in table 5-4. Deflection should be 8 divisions ±3% for each checkpoint.

c. Change DISPLAY to B and repeat step b for channel B.

d. Return Model 1740A controls to initial settings.

Table 5-4. Deflection Factor Accuracy

VOLTS/DIV Settings	Dc Standard Settings
20	160 V
10	80 V
5	40 V
2	16 V
1	8 V
.5	4 V
.2	1.6 V
.1	.8 V
.05	.4 V
.02	.16 V
.01	.08 V
.005	.04 V

5-34. CALIBRATOR. Amplitude: 1 V p-p into 1 megohm, ±1.0%; 0.1 V into 50 ohms with <0.1 μs rise time. Calibrator amplitude is checked against a known dc standard. Rise time is measured directly on CRT.

Equipment Required:

Dc Standard
Adapter: male banana jack to female BNC
50-ohm, 48-inch BNC Cable
Test lead
Adapter: female banana jack to male BNC

5-35. Perform calibrator test as follows:

a. Set Channel A VOLTS/DIV to .2.

b. Connect dc standard to channel A INPUT.

c. Set dc standard for a +1 V output and carefully note vertical deflection.

d. Disconnect dc standard and connect CAL 1V output to channel A INPUT using test lead and adapter. Deflection should be within ±1.0% of that noted in step c.

e. Set channel A VOLTS/DIV to .02 and coupling to 50 ohms. Set MAIN TIME/DIV control to .05 μSEC and measure rise time. Rise time should be less than 0.1 μs.

f. Disconnect equipment and return controls to initial settings.

5-36. ADJUSTMENTS.

5-37. The following paragraphs provide adjustment procedures to return the Model 1740A to peak operating condition when repairs are required. In addition to complete step-by-step procedures, a condensed adjustment procedure is included (table 5-9) for the convenience of technicians who have sufficient experience with the Model 1740A. For best results, adjustments should be performed at room temperature and in the sequence provided, since several adjustments are directly related to preceding adjustments. Adjustment location photographs are provided on a foldout page at the rear of this section. Schematics, troubleshooting information, and other service data are provided in Section VIII.

5-38. Althrough this instrument has been designed in accordance with international safety standards, this manual contains information and warnings which must be followed to ensure safe operation and to retain the instrument in safe condition. Service and adjustments should be performed only by qualified service personnel.

WARNING

Read the Safety Summary at the front of this manual before performing adjustment procedures.

NOTE

See figure 5-5 for adjustment locations.

5-39. Remove top and bottom covers from Model 1740A, set controls to initial settings, apply power, and allow fifteen minutes for instrument warmup.

5-40. LOW VOLTAGE POWER SUPPLY ADJUSTMENT.

Equipment Required:

Digital Voltmeter

a. Connect digital voltmeter between A16TP4 and ground test point, A16TP3.

b. Adjust A16R26, +15 V Adj., for +15 Vdc ±10 mV.

c. If desired, check other voltages as indicated in table 5-5. Supplies should remain within ripple specifications at both high- and low-line conditions.

d. Disconnect equipment.

Table 5-5. Low-voltage Supply Limits

VOLTAGE	TEST POINT	LIMITS	RIPPLE
—15 V	A16TP1	± 300 mV	< 10 mV
+5 V	A16TP2	± 100 mV	< 5 mV
+15 V	A16TP4	previously set to <±10 mV	< 10 mV
+43 V	A16TP5	± .8 V	< 5 mV
+122 V	A16TP6	± 6 V	< 20 mV

5-41. INTENSITY LIMIT ADJUSTMENT.

a. Set Model 1740A controls as follows:

DLY'D TIME/DIV	10 μSEC
BEAM INTENSITY	minimum (CCW)

b. Adjust A15R2, intensity limit adj. until intensified portion of sweep is just extinguished.

c. Return controls to initial settings.

5-42. ASTIGMATISM AND FOCUS ADJUSTMENT.

a. Set Model 1740A controls as follows:

MAIN TIME/DIV	1 SEC
SWEEP VERNIER	fully CCW
BEAM INTENSITY	barely visible spot

b. While spot slowly moves across CRT, adjust FOCUS on front panel and ASTIGMATISM on rear panel for smallest and best-defined spot.

c. Return controls to initial settings.

5-43. GATE RESPONSE ADJUSTMENT.

Equipment Required:

Monitor Oscilloscope (HP Model 1707B with 10:1 divider probe)

a. Using 10:1 divider probe and monitor oscilloscope, monitor gate output at A12TP1.

b. Vary BEAM INTENSITY to set gate amplitude to 25 V peak.

c. Set Model 1740A MAIN TIME/DIV to .5 μSEC.

d. Adjust A12R12 and A12C11, gate comp adj., for best response, ≤3% overshoot.

e. Disconnect equipment and return Model 1740A controls to initial settings.

5-44. FLOODGUN GRID ADJUSTMENT.

a. Set SCALE ILLUM fully CW.

b. Adjust A16R20, F.G. adj., for maximum brightness with uniform illumination.

c. Decrease SCALE ILLUM and verify that CRT remains evenly illuminated.

5-45. TRACE ALIGN AND Y-AXIS ALIGN ADJUSTMENT. (Omit this paragraph for Option 101 instruments and proceed to paragraph 5-46.)

Equipment Required:

Oscillator

a. Obtain horizontal baseline.

b. Adjust TRACE ALIGN on rear panel to make horizontal trace exactly parallel with the CRT graticule lines.

c. Set display mode to A VS B.

d. Connect oscillator to channel A INPUT.

e. Adjust oscillator for approximately 1-kHz signal with 8 divisions of vertical deflection.

f. Adjust A12R16, Y-align, so that vertical trace is parallel with the vertical graticule line.

g. Disconnect equipment and return Model 1740A controls to initial settings.

5-46. TRACE ALIGN AND Y-AXIS ALIGN ADJUSTMENTS. (Option 101 instruments only.)

Equipment Required:

Oscillator

a. Obtain horizontal baseline.

b. Adjust TRACE ALIGN on rear panel until horizontal trace is exactly parallel with the CRT graticule lines.

c. Set main TIME/DIV to 1 mSEC.

d. Connect oscillator to channel A INPUT.

e. Adjust oscillator for approximately 500-kHz signal with 8 divisions of vertical deflection.

f. With horizontal POSITION, place left side of raster at center screen.

g. Adjust A12R16, Y-align, until left side of raster is parallel to vertical graticule lines.

h. Disconnect equipment and return Model 1740A controls to initial settings.

5-47. CALIBRATOR AMPLITUDE ADJUSTMENT.

Equipment Required:

Digital Voltmeter

a. Connect digital voltmeter between CAL 1 V output and ground.

b. Adjust A3R116, calibrator amp., for an indication of 0.500 V ±5 mV. Since the calibrator signal is a symmetrical square wave, by adjusting the amplitude for 0.5 V average value, the peak value of the calibrator pulse will be 1 V ±10 mV.

c. Disconnect equipment.

5-48. TRIGGER SENSITIVITY ADJUSTMENT.

Equipment Required:

Oscillator
BNC Tee
Adapter, male banana to female BNC
50-ohm feedthrough termination
Two 50-ohm, 48-in. BNC Cables

a. Set Model 1740A controls as follows:

VOLTS/DIV (channel A)	.005
Coupling (channel A)	50 ohms
Main INT/EXT	EXT

b. Connect oscillator to both channel A INPUT and main EXT TRIGGER input, using adapter and BNC Tee. Terminate the EXT TRIGGER input with the 50-ohm feedthrough termination.

c. Set oscillator to obtain a 50-kHz, 15-mV p-p sine wave (3 div).

d. Set main AUTO/NORM to NORM.

e. Adjust main trig. sens. A7R20 fully CW.

f. Slowly rotate main TRIGGER LEVEL from one extreme to the other. Note that one sweep occurs for each direction of rotation.

g. While rotating TRIGGER LEVEL, slowly adjust main trig. sens. A7R20 CCW until sweep occurs for only one direction of rotation of TRIGGER LEVEL.

h. Set main AUTO/NORM to AUTO.

i. Increase oscillator amplitude to 20 mV p-p (4 div).

j. Set main AUTO/NORM to NORM.

k. Rotate main TRIGGER LEVEL. A sweep should occur for each direction of rotation.

l. Change Model 1740A controls as follows:

Main AUTO/NORM	AUTO
Sweep mode	DLY'D
Main TIME/DIV	.1 mSEC
Delayed TIME/DIV	50 μSEC
Main INT/EXT	INT
Delayed INT/EXT	EXT

m. Disconnect oscillator from main EXT TRIGGER and connect to delayed EXT TRIGGER.

n. Set oscillator for a 50-kHz, 15-mV p-p sine wave.

o. Set SWEEP AFTER DELAY to TRIG.

p. Adjust delayed trig. sens. A10R9 fully cw.

q. While rotating delayed TRIGGER LEVEL from one extreme to the other, adjust A10R9 CCW until sweep occurs for only one direction of rotation or not at all.

r. Set SWEEP AFTER DELAY to AUTO.

s. Increase oscillator output to 20 mV p-p.

t. Set SWEEP AFTER DELAY to TRIG.

u. Rotate delayed TRIGGER LEVEL. A sweep should occur for each direction of rotation.

v. Disconnect equipment and return controls to initial settings.

5-49. SYNC ZERO ADJUSTMENT.

Equipment Required:

Oscillator

a. Connect oscillator to channel A INPUT.

b. Set oscillator controls to obtain a 1-kHz sine wave at approximately six divisions.

c. Adjust main TRIGGER LEVEL for a stable display.

d. Change main trigger coupling between AC and DC and note shift in trigger point.

e. Adjust A7R41, sync zero, until no shift occurs.

f. Disconnect equipment and return Model 1740A controls to initial settings.

5-50. TRIGGER VIEW BALANCE ADJUSTMENT.

Equipment Required:

Oscillator

a. Set Model 1740A controls as follows:

TRIGGER VIEW	depressed
Main AUTO/NORM	NORM
Main INT/EXT	EXT

b. Connect oscillator to main EXT TRIGGER input.

c. Set oscillator for approximately 100-mV p-p, 10-kHz sine wave.

d. Adjust main TRIGGER LEVEL for stable display.

e. Decrease oscillator amplitude to lowest amplitude where stable triggering can be maintained.

f. Adjust A3R86, trig. view bal., until trigger view display is centered on middle horizontal graticule line.

g. Disconnect equipment and return Model 1740A controls to initial settings.

5-51. DELAY START ADJUSTMENT.

Equipment Required: None.

a. Set Model 1740A controls as follows:

MAIN TIME/DIV	.1 mSEC
DLY'D TIME/DIV	.05 μSEC
DELAY	.2

b. Set horizontal POSITION control so that sweep starts exactly on the far left graticule line.

c. Adjust A7R169, delay start, until intensified marker is 2 mm after sweep start point.

d. Return Model 1740A controls to initial settings.

5-52. HORIZONTAL AMPLIFIER GAIN ADJUSTMENTS.

Equipment Required:

Time-mark Generator

a. Set Model 1740A controls as follows:

Channel A Coupling	50Ω
Channel A VOLTS/DIV	.5
DLY'D TIME/DIV	.05 μSEC
DELAY	1.00

b. Adjust horizontal POSITION control until intensified dot is exactly on second vertical graticule line.

NOTE

A slight reduction in intensity may be helpful.

c. Set DELAY control to 9.00 position.

d. Adjust A7R93, X1 gain, until intensified dot is on 10th vertical graticule line from left.

e. Set DELAY control to 1.00 position.

f. Repeat steps b through e until intensified dot is on second vertical graticule line when DELAY control is a 1.00 position and is on 10th vertical graticule line from left when DELAY control is at 9.00 position.

g. Connect time-mark generator to channel A INPUT connector.

h. Set time-mark generator for .5 μSEC time markers.

i. Set MAIN TIME/DIV to .5 μSEC.

j. Using horizontal POSITION control, align time markers with vertical graticule lines.

k. On main sweep assembly, A8, adjust .05 - 2 μSEC, A8R43, for exactly one time marker per division.

l. Set HORIZ DISPLAY control to MAG X10.

m. Using horizontal POSITION control, align one time marker with first left vertical graticule line.

n. On horizontal sweep assembly, A7, adjust A7R117, X10 gain, until one time marker coincides with first left vertical graticule line and one time marker coincides with last right vertical graticule line.

o. Disconnect equipment and return Model 1740A controls to initial settings.

5-53. X10 AMPLIFIER BALANCE ADJUSTMENT.

Equipment Required:

Time-mark Generator

a. Set Model 1740A controls as follows:

Coupling (channel A)	50Ω
VOLTS/DIV (channel A)	.5
MAIN TIME/DIV	1 μSEC

b. Connect time-mark generator to channel A INPUT connector.

c. Set time-mark generator for 5 μSEC time markers and observe three time marks.

d. Using horizontal POSITION control, center middle time marker on CRT screen.

e. Engage MAG X10 switch and adjust A7R105, mag. center, to center time mark.

f. Disconnect equipment and return Model 1740A controls to initial settings.

5-54. HORIZONTAL LINEARITY ADJUSTMENT.

Equipment Required:

Time-mark Generator

a. Connect time-mark generator to channel A INPUT.

b. Set Model 1740A controls as follows:

Coupling (channel A)	50Ω
VOLTS/DIV	.2
MAIN TIME/DIV	.05 μSEC
MAG X10	engaged

c. Set time-mark generator for 10 ns markers.

d. Starting with A11R10 and A11R15, linearity adj. fully CW, adjust for best overall linearity in the center 8 divisions of unmagnified sweep (center 80 divisions of magnified sweep).

e. Disconnect equipment and return Model 1740A controls to initial settings.

5-55. PRELIMINARY MAIN SWEEP CALIBRATION.

Equipment Required:

Time-mark Generator

a. Set MAIN TIME/DIV and time-mark generator as indicated in table 5-6 and make adjustments to obtain one marker/division.

Table 5-6. Preliminary Main Sweep Calibration

MAIN TIME/DIV Settings	Time-mark Generator Settings	Adjust
1 μSEC	1 μs	A8R43
10 μSEC	10 μs	A8R12
1 mSEC	1 ms	A8R13
50 mSEC	50 ms	A8R14

5-56. DELAYED SWEEP ADJUSTMENT.

Equipment Required:

Time-mark Generator

a. Connect time-mark generator to channel A INPUT.

b. Set Model 1740A controls as follows:

Coupling (channel A)	50Ω
VOLTS/DIV	.5
Sweep Mode	DLY'D

c. Set time-mark generator, MAIN TIME/DIV, and DLY'D TIME/DIV as indicated in table 5-7 and make necessary adjustments. If necessary, compromise so that all ranges controlled by a particular adjustment are in specified tolerance.

d. Disconnect equipment and return Model 1740A controls to initial settings.

5-57. MAIN SWEEP FINE ADJUSTMENTS. These adjustments utilize the accuracy of the DELAY dial to calibrate main sweep more accurately than is possible using the visual method (paragraph 5-54). These adjustments must be accomplished if the differential time accuracy specification is to be met.

Equipment Required:

Time-mark Generator

a. Connect time-mark generator to channel A INPUT connector.

b. Set Model 1740A front-panel controls as follows:

Coupling (channel A)	50Ω
VOLTS/DIV (channel A)	.5
MAIN TIME/DIV	.5 μSEC
DLY/D TIME/DIV	.05 μSEC
Horiz. Display	DLY'D
AUTO/NORM	NORM

Table 5-7. Delayed Sweep Calibration Adjustments

MAIN TIME/DIV Settings	DLY'D TIME/DIV Settings	Time-mark Generator Settings	Adjust	Tolerance
.1 μSEC	.05 μSEC	50 ns	A9R28	±2%
.2 μSEC	.1 μSEC	.1 μs		
.5 μSEC	.2 μSEC	.2 μs		
1 μSEC	.5 μSEC	.5 μs		
2 μSEC	1 μSEC	1 μs		
5 μSEC	2 μSEC	2 μs		
10 μSEC	5 μSEC	5 μs	A9R10	±2%
20 μSEC	10 μSEC	10 μs		
50 μSEC	20 μSEC	20 μs		
.1 mSEC	50 μSEC	50 μs		
.2 mSEC	.1 mSEC	.1 mSEC		
.5 mSEC	.2 mSEC	.2 mSEC		
1 mSEC	.5 mSEC	.5 mSEC	A9R11	±2%
2 mSEC	1 mSEC	1 mSEC		
5 mSEC	2 mSEC	2 mSEC		
10 mSEC	5 mSEC	5 mSEC		
20 mSEC	10 mSEC	10 mSEC		
50 mSEC	20 mSEC	20 mSEC		

c. Set time-mark generator for .5 μs markers.

d. Set DELAY potentiometer to 1.00 position.

e. Using channel A POSN control, center vertically time-mark display on CRT.

f. Using horizontal POSITION control, set leading edge of time mark to center CRT graticule line.

g. Set DELAY potentiometer to 9.00 position.

h. Adjusting .05 - 2 μSEC, A8R43, set leading edge of time marker to center CRT graticule line.

i. Repeat steps d through h until leading edge of time marker can be set to center CRT graticule line with DELAY dial set at 9.00.

j. This completes step 1 in table 5-8. Complete remaining steps in table by repeating above procedure for each step.

k. Disconnect equipment and return Model 1740A controls to initial settings.

5-58. VERTICAL AMPLIFIER BALANCE ADJUSTMENT.

Equipment Required:

Digital Voltmeter

a. Set channel A and B coupling to 50Ω and VOLTS/DIV (channels A and B) to .05.

b. Connect digital voltmeter to A3TP9.

c. Adjust A3R11, channel A FET balance, for 0 V ±0.5 mV.

d. Change DISPLAY to B.

e. Connect digital voltmeter to A3TP10.

f. Adjust A3R31, channel B FET balance, for 0 V ±0.5 mV.

g. Disconnect voltmeter.

h. Change DISPLAY to A.

i. Set channel A and B VOLTS/DIV switches to .005.

j. While changing channel A VOLTS/DIV between .005, .01, and .02, adjust A3R18, channel A 5-mV balance, for minimum trace shift between these three ranges.

k. Rotate channel A VOLTS/DIV between .005 and .05 and adjust A3R19, channel A 50-mV balance, for minimum trace shift between these two ranges.

l. Change DISPLAY to B.

m. Rotate channel B VOLTS/DIV between .005, .01, and .02, and adjust A3R77, channel B 5-mV balance, for minimum trace shift between these three ranges.

n. Rotate channel B VOLTS/DIV between .005 and .05 and adjust A3R76, channel B 50-mV balance, for minimum trace shift between these two ranges.

o. While switching CH B INVT selector between its engaged and disengaged position, adjust A3R90, polarity balance, until trace shift is minimal. If A3R90 is changed, recheck steps m and n for correct balance. If additional adjustments are made for m and n, recheck adjustment of A3R90 as described above.

p. Return controls to initial settings.

5-59. POSITION AND SYNC BALANCE ADJUSTMENT.

Equipment Required:

Oscillator
BNC Tee

a. Set Model 1740A controls as follows:

DISPLAY.............................. B
POSN (channel B) .... 12 o'clock

b. Switch between normal and MAG X5 and adjust A3R32, channel B posn for minimum trace shift.

c. Change Model 1740A controls as follows:

DISPLAY............................ ALT
TRIGGER .... COMP
VOLTS/DIV (both channels)........... .01

Table 5-8. Main Sweep Fine Adjustment

Step	Time-mark Generator Setting	MAIN TIME/DIV Setting	DLY'D TIME/DIV Setting	Adjust
1	.5 μs	.5 μSEC	.05 μSEC	A8R43
2	10 μs	10 μSEC	1 μSEC	A8R12
3	1 ms	1 mSEC	.1 mSEC	A8R13
4	50 ms	50 mSEC	5 mSEC	A8R14

d. Connect a 10-kHz sine wave to both channels. Cables between BNC tee and input connectors should be of equal length.

e. Adjust oscillator for 0.5 divisions of vertical deflection.

f. Adjust sync A bal. A3R79 until both channels trigger stably and are in phase. If A3R79 is changed, recheck steps j and k in paragraph 5-57 for correct balance. If additional adjustments are made for j and k, recheck adjustment of A3R79 as described above.

g. Disconnect oscillator.

h. Return Model 1740A controls to initial settings.

i. Switch between normal and MAG X5 and adjust A3R58, channel A POSN, for minimum trace shift.

j. Disengage MAG X5.

5-60. INPUT CAPACITANCE AND ATTENUATOR COMPENSATION ADJUSTMENTS.

Equipment Required:

Square-wave Generator
LCR Meter

a. Connect square-wave generator to channel A INPUT.

b. Set Model 1740A controls as follows:

Coupling (channel A)	50Ω
VOLTS/DIV (channel A)	.5
MAIN TIME/DIV	20 μSEC

c. Set square-wave generator controls to obtain a 3-V peak, 5-kHz square wave.

d. Adjust A3C2, .5 volt comp., with insulated adjusting tool for best square-wave response.

e. Disconnect square-wave generator.

f. Set Model 1740A controls as follows:

VOLTS/DIV (both channels)	.2
Coupling (channel A)	DC

g. Connect LCR Meter to channel A INPUT and observe reading (19.5 to 21.5 pF).

h. Set channel A VOLTS/DIV to .5.

i. Adjust A3C4, channel A input cap., to obtain same reading as noted on .2 range (step g).

j. Disconnect LCR meter.

k. Change DISPLAY to B and repeat steps a through j for channel B, adjusting A3C17, channel B .5 V input comp., and A3C19, channel B .5 V cap.

l. Disconnect equipment and return Model 1740A controls to initial settings.

5-61. VERTICAL GAIN ADJUSTMENT.

Equipment Required:

Test Lead

a. Connect CAL 1 V output to channel A INPUT using test lead and adapter.

b. Set Model 1740A controls and adjustments as follows:

VOLTS/DIV (both channels)	.2
A3R49, channel A gain	fully CW
A3R46, channel B gain	fully CW

c. Note signal amplitude of channel A.

d. Change DISPLAY and TRIGGER to B and change CAL signal from A to B input.

e. If channel B amplitude is larger than channel A, turn A3R46, channel B gain, CCW until channel gains are equal. If channel A is larger than channel B, turn A3R49, channel A gain, CCW until gains are equal.

f. Adjust A3R65, overall gain, to display exactly 5 divisions vertically.

g. Disconnect equipment and return Model 1740A controls to initial settings.

5-62. PULSE RESPONSE ADJUSTMENT.

Equipment Required:

Fast-rise Pulse Generator

a. Connect fast-rise pulse generator to channel A INPUT.

b. Set Model 1740A controls as follows:

Coupling (both channels)	50Ω
MAIN TIME/DIV	.05 μSEC
A5R19	fully CCW
A5R20	fully CCW
A5R22	fully CCW
A5R24	fully CCW

c. Set channel A VOLTS/DIV and pulse generator controls as necessary to obtain a 6-division display. If possible, make adjustments on the .01 VOLTS/DIV ranges.

WatchguarD

d. Adjust A5R24, HF No. 1, CW to partially smooth front edge perturbation. Adjust A5R20, HF No. 2, CW to speed up front edge (see figure 5-4).

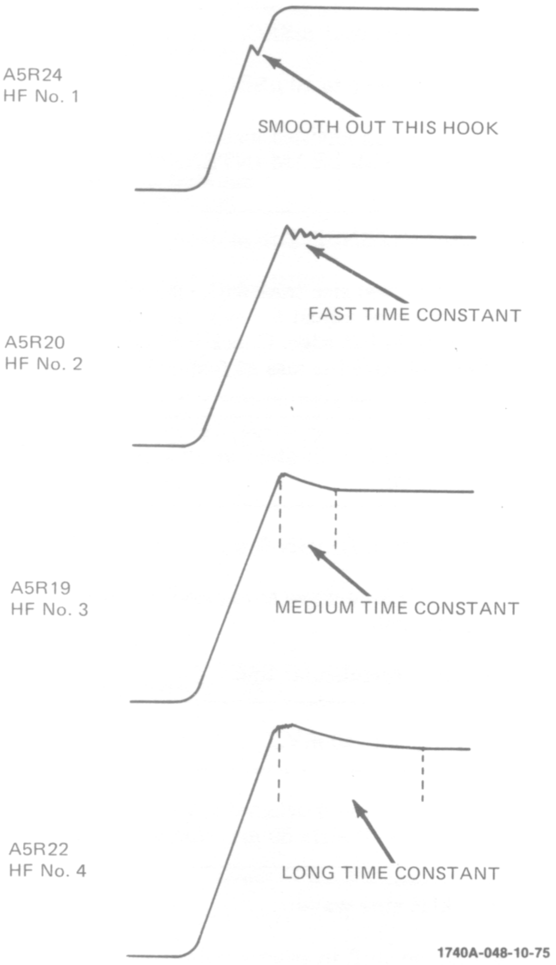


Figure 5-4. Pulse Response Adjustments

e. Alternately adjust A5R24 and A5R20 to set leading edge of pulse to most resemble its known characteristics.

NOTE

If pulse generator being used is specified for 3% overshoot, do not set adjustments for less than 3% since this is effectively detuning the vertical amplifier bandwidth.

f. Adjust A5R19, HF No. 3, for flattest pulse top (medium time constant).

g. Adjust A5R22, HF No. 4 for flattest pulse top (long time constant).

h. Check adjustment again since some interaction occurs (steps d through g).

i. Change DISPLAY to B.

j. Connect the fast-rise pulse generator to channel B INPUT.

k. Adjust A3R22, channel B HF adj., to make the channel B display as similar as possible to the channel A display.

l. Disconnect equipment and return Model 1740A controls to initial settings.

NOTE

Check bandwidth (paragraph 5-12) after making response adjustments. If bandwidth is low or marginal, adjust A5R24, HF No. 1, slightly CW to speed up response; then adjust A5R20, HF No. 2, slightly CW to optimize pulse response again.

5-63. X-Y GAIN ADJUSTMENT. (Not required on Option 101 instruments.)

Equipment Required:

Oscillator
Power Divider

a. Connect oscillator to both channels, using a 50-ohm power divider, two 9-inch 50-ohm cables, and a 48-inch 50-ohm cable.

b. Adjust oscillator and channel A VOLTS/DIV for exactly 6 divisions of vertical deflection. Oscillator should be set for a low frequency (<1 kHz).

c. Change sweep mode to A VS B.

d. With channel B VOLTS/DIV set to same setting as channel A, adjust A7R97, A—B cal., for exactly 6 divisions of horizontal deflection.

e. Disconnect equipment and return Model 1740A controls to initial settings.

Table 5-9. Condensed Adjustment Procedure

Adjustment	Procedure
+15 V Adj., A16R26	+15 Vdc ±10 mV.
Intensity Limit Adj., A15R2	1. Set main sweep to .1 mSEC. 2. Set delayed sweep to 10 μSEC. 3. Adjust so that intensified sweep is just extinguished with BEAM INTENSITY at minimum.
Gate Comp Adj., A12R12 and A12C11	1. Set BEAM INTENSITY to midrange. 2. Adjust for fastest rise time with <3% overshoot. Observe trace or adjust for even intensity, particularly at left edge. Check for less than 1 division of baseline loss at fastest sweep speed.
F. G. Adj., A16R20	Adjust for uniform illumination at all settings of SCALE ILLUM.
TRACE ALIGN (rear panel) and Y-align (A12R16)	1. Perform TRACE ALIGN first. 2. Apply 10-kHz sine wave to channel B while in A VS B mode. 3. Adjust for perpendicular line.
Calibrator Amp., A3R116	Adjust for 1 V peak ±10 mV.
Main Trig. Sens. Adj., A7R20 Delayed Trig. Sens. Adj., A10R86	Adjust so both main and delayed trigger circuit recognize a 10-MHz 30 mV sine wave.
Sync Zero, A7R41	1. Apply 1-kHz sine wave. 2. Adjust for no shift in trigger point while switching time base to AC/DC coupling.
Trig. View Bal., A3R86	1. Apply small sine wave to main EXT TRIGGER. 2. Select TRIG VIEW mode. 3. Adjust to position the triggered display to center screen.
HORIZ Amp Gain X1 Gain A7R93	1. Turn Delayed Sweep to .05 μSEC to obtain intensified dot on main sweep. 2. Set DELAY to 1.00 and position intensity spot to 2nd graticule line.
Delay Start Adj. A7R169	With MAIN TIME/DIV set to .1 mSEC, DLY'D TIME/DIV set to .05 μSEC, and DELAY to .2, set intensified spot 2 mm after sweep start point.

Table 5-9. *Condensed Adjustment Procedure (Cont'd)*

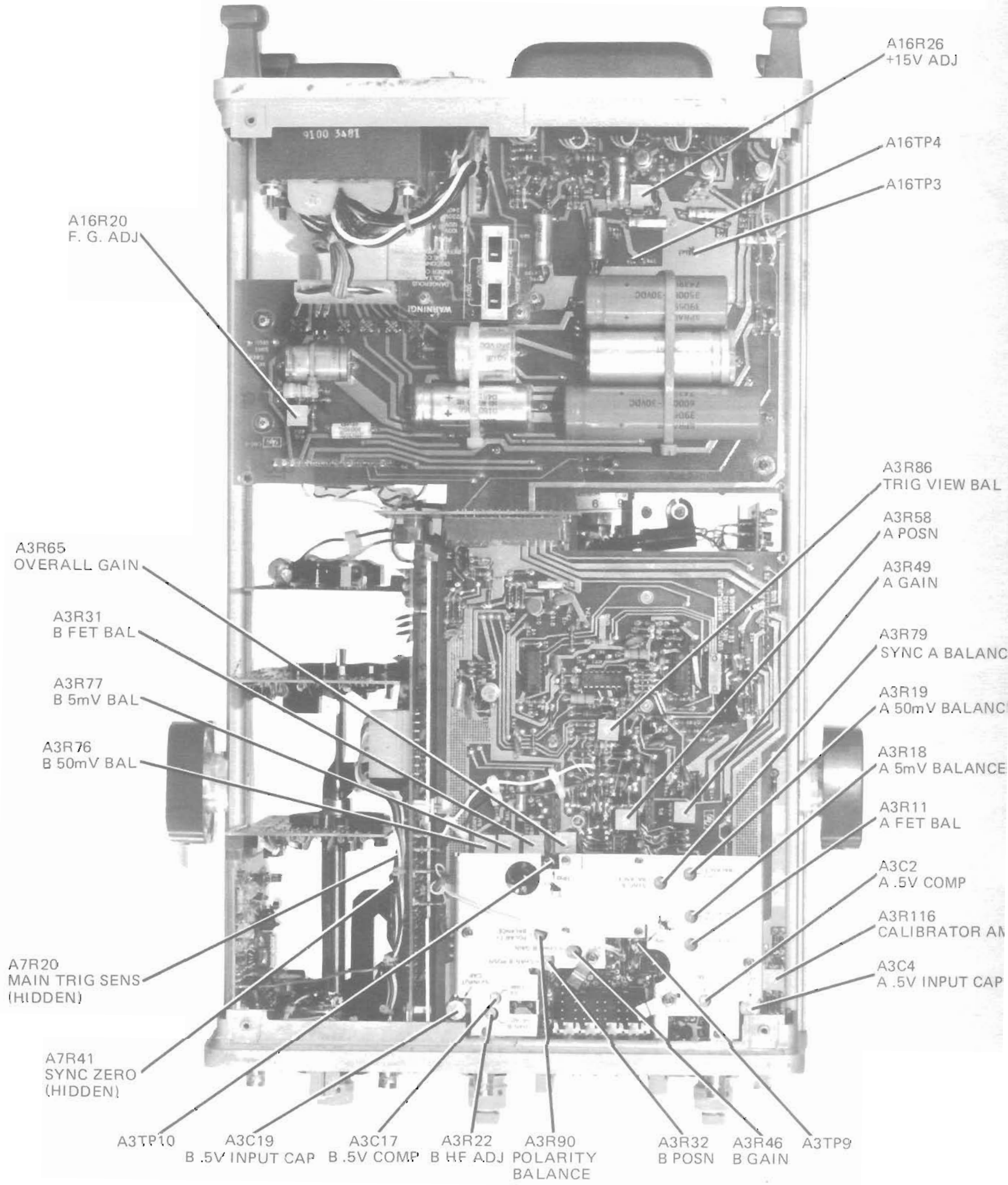
Adjustment	**Procedure**	
	3. Set DELAY to 9.00. Adjust A7R93 to position bright spot to 10th line.	
.05 - 2 μSEC A8R43	4. Set for 1 marker/div.	
X10 Gain A7R117	5. Set for 1 marker/10 div.	
HORIZ Amp Balance Mag Center A7R105	1. Set so that display at center screen remains at center screen when MAG X10 is used.	
HORIZONTAL LINEARITY A11R10 A11R15	1. Adjust on .05 μSEC range, using MAG X10, observing a 10-ns sine wave.	
PRELIMINARY MAIN SWEEP CAL		
A8R43	1. 1 μSEC range	
A8R12	2. 10 μSEC range	
A8R13	3. 1 mSEC range	
A8R14	4. 50 mSEC range	
DELAYED SWEEP CAL		
A9R28	1. .5 μSEC range	
A9R10	2. 5 μSEC range	
A9R11	3. .5 mSEC range	
MAIN SWEEP FINE ADJ	Use DELAY dial at setting of 1.00 and 9.00 to adjust main sweep.	
	Main Sweep and Time Mark	Delayed Sweep
A8R43	.5 μSEC	.05 μSEC
A8R12	10 μSEC	1 μSEC
A8R13	1 mSEC	.1 mSEC
A8R14	50 mSEC	5 mSEC
Vertical Amplifier Balance		
A3R11	1. Connect DVM to A3TP9 and adjust A FET balance for 0 V ±.5 mV. Adjust on 50 mV range.	
A3R31	2. Connect DVM to A3TP10 and adjust B FET balance for 0 V ±.5 mV. Adjust on 50 mV range.	

Table 5-9. Condensed Adjustment Procedure (Cont'd)

Adjustment	Procedure
Vertical Amplifier Balance (Cont'd)	
A3R18	3. Switch channel A VOLTS/DIV between .005 and .02 and adjust 5-mV balance for minimum trace shift.
A3R19	4. Switch channel A VOLTS/DIV between .005 and .05 and adjust 50-mV balance for minimum trace shift.
A3R77	5. Switch channel B VOLTS/DIV between .005 and .02 and adjust 5-mV balance for minimum trace shift.
A3R76	6. Switch channel B VOLTS/DIV between .005 and .05, and adjust 50-mV balance for minimum trace shift.
A3R90	7. Engage/disengage CH B INVT and adjust for minimum trace shift. Readjust A3R77 and A3R76 if necessary.
Position and Sync Balance	
A3R32	1. Select B DISPLAY; switch between normal and MAG X5, and adjust channel B POSN for minimum trace shift.
A3R79	2. Apply 10-kHz sine wave to both channels. Select ALT mode and COMP TRIGGER, and adjust sync A balance for stable triggering and minimum phase shift. Readjust A3R18 and A3R19 if necessary.
A3R58	3. Select A DISPLAY; switch between normal and MAG X5, and adjust channel A position for minimum trace shift.
Input C and Attenuator Compensation (Channel A)	
A3C2	1. Apply 10-kHz square wave, and adjust .5 V comp for best response.
A3C4	2. Adjust .5 V input cap to make .5 VOLTS/DIV range match reading on .2 range (19.5 to 21.5 pF).
Input C and Attenuator Compensation (Channel B)	
A3C17	1. Apply 10-kHz square wave, and adjust .5 V comp for best response.

Table 5-9. Condensed Adjustment Procedure (Cont'd)

Adjustment	Procedure
Input C and Attenuator Compensation (Cont'd) A3C19	2. Adjust .5 V input cap to make .5 VOLTS/DIV range match reading on .2 range (19.5 to 21.5 pF).
Gain	
A3R49	1. Channel A fine gain.
A3R46	2. Channel B fine gain.
A3R65	3. Composite gain.
Pulse Response	
A5R24	1. Short time constant.
A5R20	2. Short time constant
A5R19	3. Medium time constant.
A5R22	4. Long time constant.
A3R22	5. Adjust to make channel B most resemble channel A.
X-Y Gain (Not applicable to Option 101)	
A7R97	Adjust for same gain on X-axis as on Y-axis.


A16R20
F. G. ADJ
A3R65
OVERALL GAIN
A3R31
B FET BAL
A3R77
B 5mV BAL
A3R76
B 50mV BAL
A7R20
MAIN TRIG SENS
(HIDDEN)
A7R41
SYNC ZERO
(HIDDEN)
A16R26
+15V ADJ
A16TP4
A16TP3
A3R86
TRIG VIEW BAL
A3R58
A POSN
A3R49
A GAIN
A3R79
SYNC A BALANC
A3R19
A 50mV BALANC
A3R18
A 5mV BALANCE
A3R11
A FET BAL
A3C2
A .5V COMP
A3R116
CALIBRATOR AM
A3C4
A .5V INPUT CAP
A3TP10
A3C19
B .5V INPUT CAP
A3C17
B .5V COMP
A3R22
B HF ADJ
A3R90
POLARITY
BALANCE
A3R32
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B GAIN
A3TP9
9100 3481
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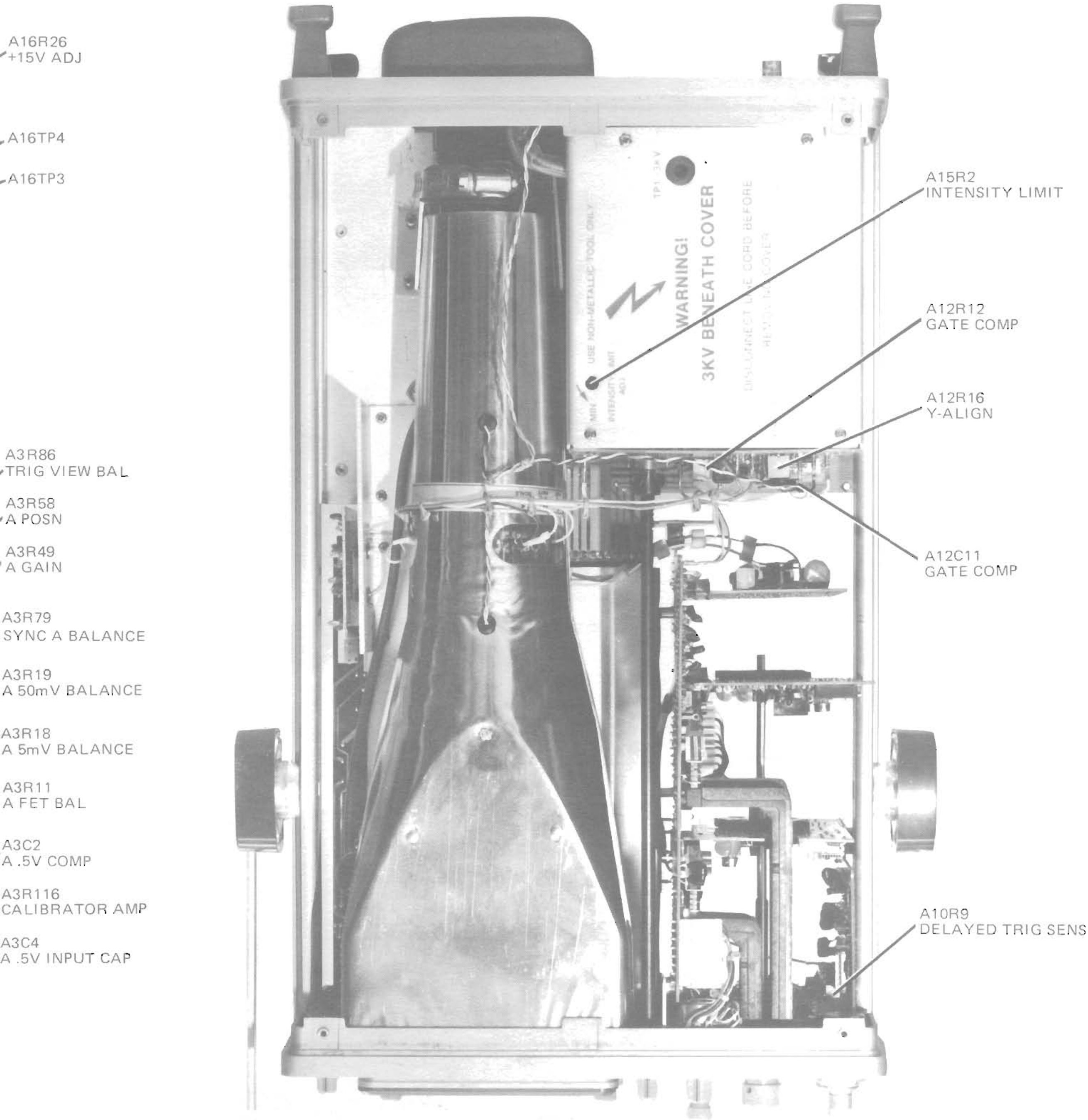
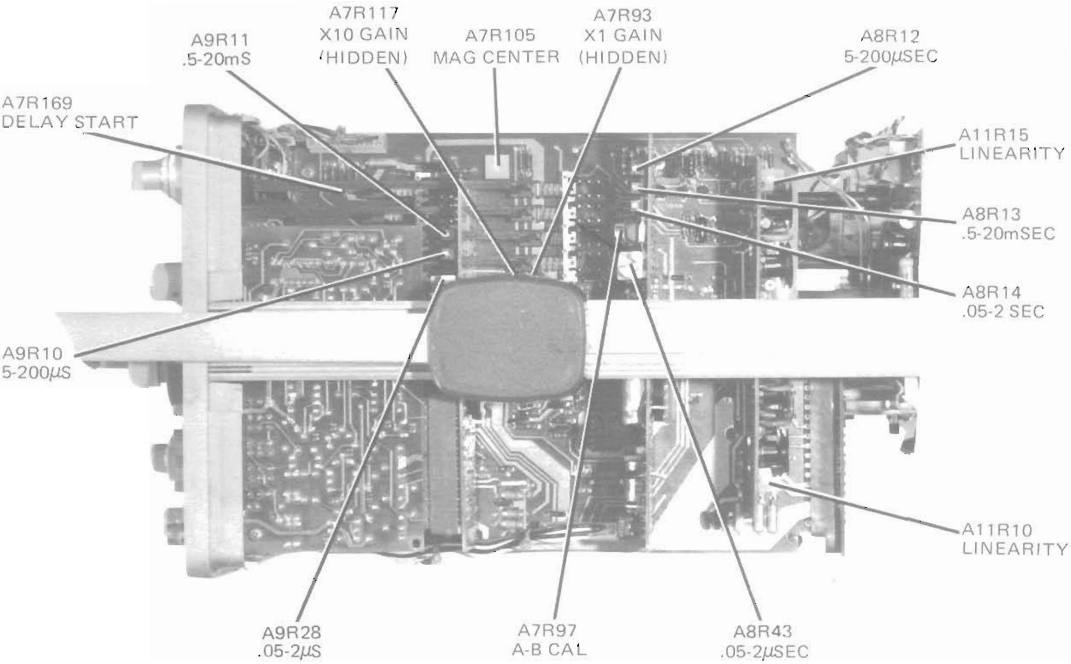
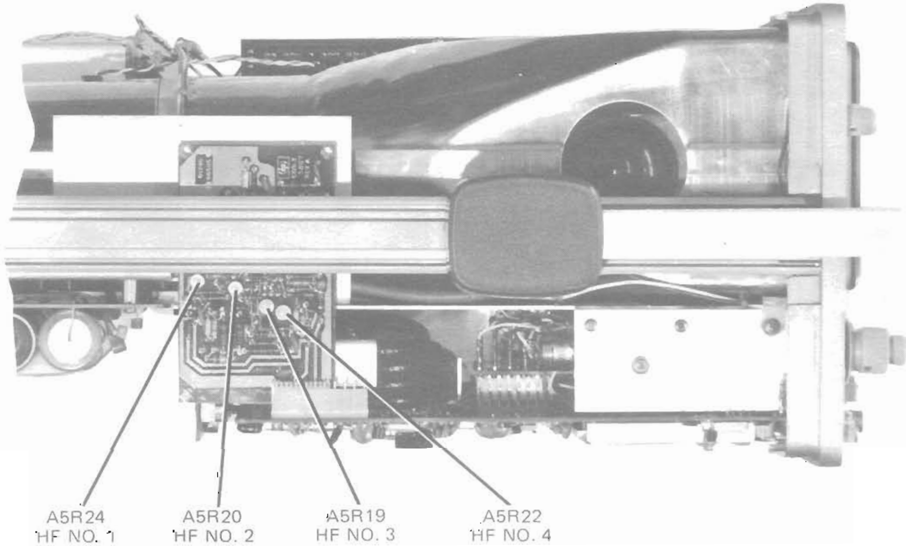

A16R26
+15V ADJ
A16TP4
A16TP3
A3R86
TRIG VIEW BAL
A3R58
A POSN
A3R49
A GAIN
A3R79
SYNC A BALANCE
A3R19
A 50mV BALANCE
A3R18
A 5mV BALANCE
A3R11
A FET BAL
A3C2
A .5V COMP
A3R116
CALIBRATOR AMP
A3C4
A .5V INPUT CAP
A15R2
INTENSITY LIMIT
A12R12
GATE COMP
A12R16
Y-ALIGN
A12C11
GATE COMP
A10R9
DELAYED TRIG SENS
TP1 3KV
WARNING!
3KV BENEATH COVER
USE NON-METALLIC TOOL ONLY
MIN
INTENSITY LIMIT
ADJ


A7R169
DELAY START
A9R11
.5-20mS
A7R117
X10 GAIN
(HIDDEN)
A7R105
MAG CENTER
A7R93
X1 GAIN
(HIDDEN)
A8R12
5-200μSEC
A11R15
LINEARITY
A8R13
.5-20mSEC
A8R14
.05-2 SEC
A9R10
5-200μS
A11R10
LINEARITY
A9R28
.05-2μS
A7R97
A-B CAL
A8R43
.05-2μSEC


A5R24
HF NO. 1
A5R20
HF NO. 2
A5R19
HF NO. 3
A5R22
HF NO. 4

1740A-049-07-76

Figure 5-5. Adjustment Locations

SECTION VI

REPLACEABLE PARTS

6-1. INTRODUCTION.

6-2. This section contains information for ordering replacement parts. The abbreviations used in the parts list are described in table 6-1. Table 6-2 lists the parts in alphanumeric order by reference designation and includes the manufacturer and manufacturer's part number. Table 6-3 contains the list of manufacturers' codes.

6-3. ORDERING INFORMATION.

6-4. To obtain replacement parts from Hewlett-Packard, address order or inquiry to the nearest Hewlett-Packard Sales/Service Office and supply the following information:

a. Instrument model and serial number.

b. HP part number of item(s).

c. Quantity of part(s) desired.

d. Reference designation of part(s).

6-5. To order a part not listed in the table, provide the following information:

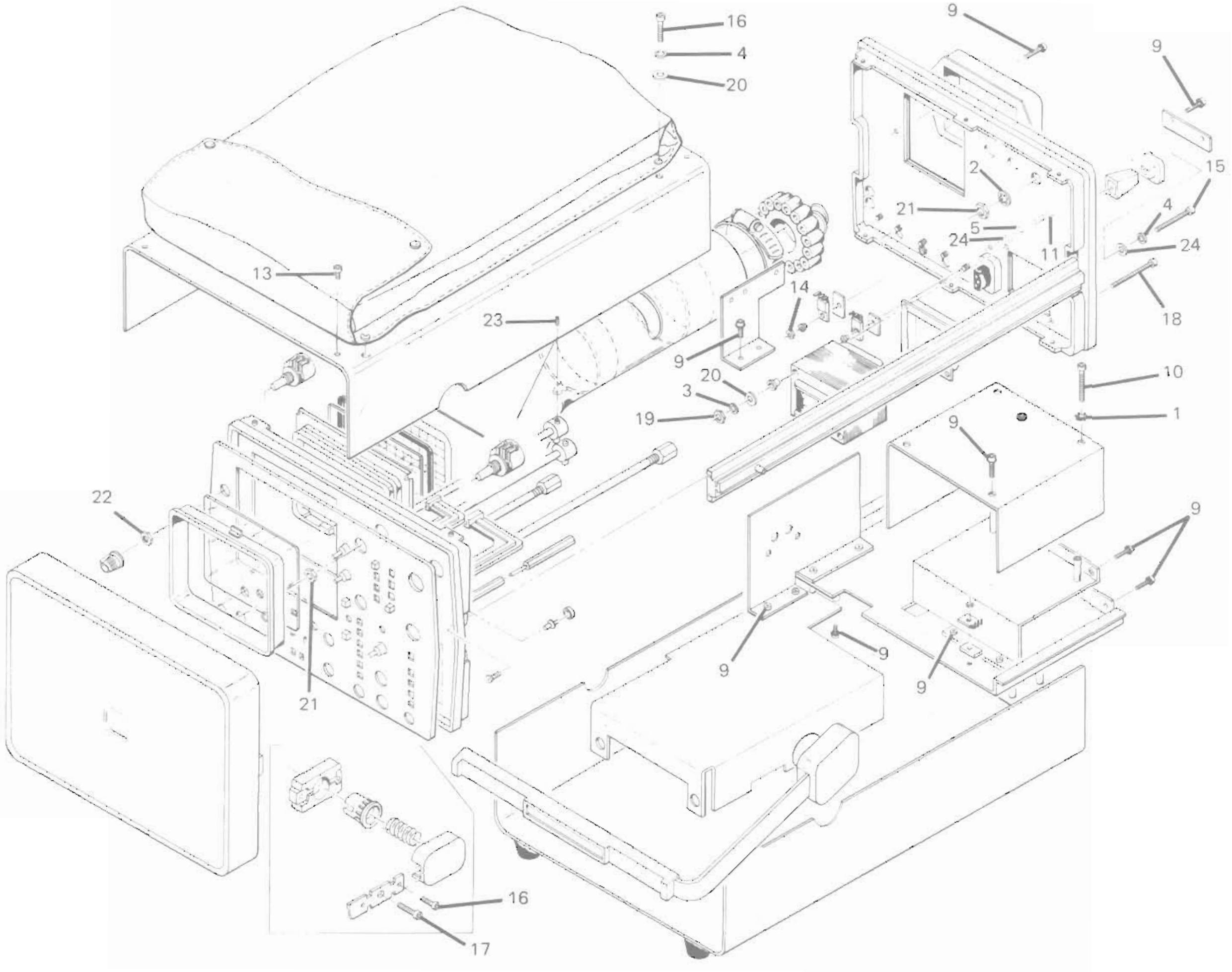
a. Instrument model and serial number.

b. Description of the part, including function and location in the instrument.

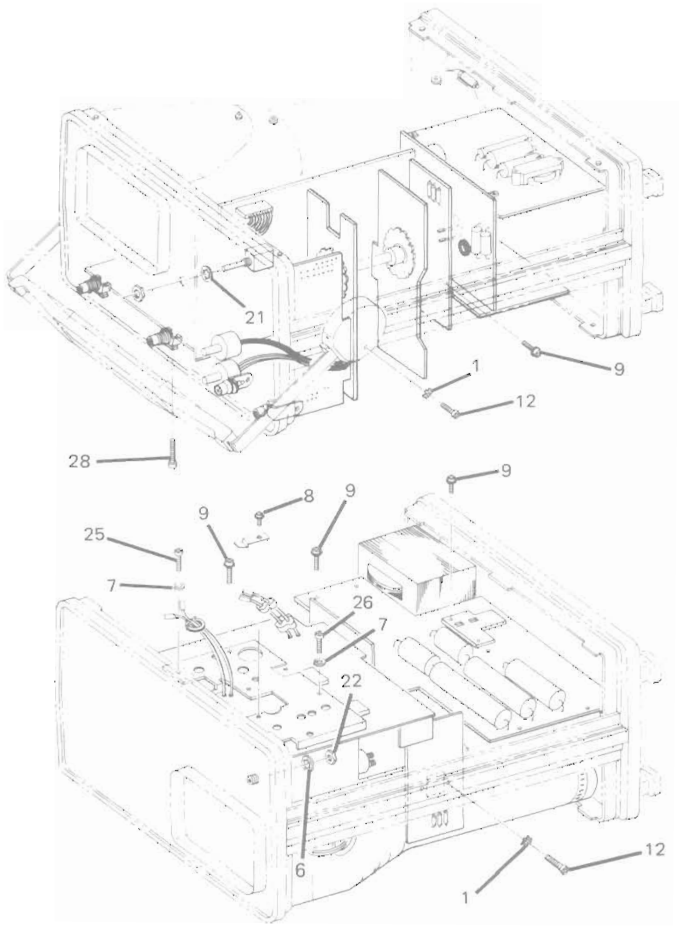
c. Quantity desired.

Table 6-1. Abbreviations for Replaceable Parts List

A	AMPERE(S)
ASSY	ASSEMBLY
BD	BOARD(S)
BH	BINDER HEAD
BP	BANDPASS
C	CENTI (10^{-2})
CAR	CARBON
CCW	COUNTERCLOCKWISE
CER	CERAMIC
CMO	CABINET MOUNT ONLY
COAX	COAXIAL
COEF	COEFFICIENT
COMP	COMPOSITION
CONN	CONNECTOR(S)
CRT	CATHODE RAY TUBE
CW	CLOCKWISE
D	DECI (10^{-1})
DEPC	DEPOSITED CARBON
DP	DOUBLE POLE
DT	DOUBLE THROW
ELECT	ELECTROLYTIC
ENCAP	ENCAPSULATED
EXT	EXTERNAL
F	FARAD(S)
FET	FIELD EFFECT TRANSISTOR(S)
FH	FLAT HEAD
FIL H	FILLISTER HEAD
FXD	FIXED
G	GIGA (10^9)
GE	GERMANIUM
GL	GLASS
GRD	GROUNDED
H	HENRY(IES)
HG	MERCURY
HP	HEWLETT PACKARD
HZ	HERTZ
IF	INTERMEDIATE FREQ
IMPG	IMPREGNATED
INCD	INCANDESCENT
INCL	INCLUDE(S)
INS	INSULATION(ED)
INT	INTERNAL
K	KILO (10^3)
KG	KILOGRAM
LB	POUND(S)
LH	LEFT HAND
LIN	LINEAR TAPER
LOG	LOGARITHMIC TAPER
LPF	LOW PASS FILTER(S)
LVR	LEVER
M	MILLI (10^{-3})
MEG	MEGA (10^6)
MET FILM	METAL FILM
MET OX	METAL OXIDE
MFR	MANUFACTURER
MINAT	MINIATURE
MOM	MOMENTARY
MTG	MOUNTING
MY	MYLAR
N	NANO (10^{-9})
N/C	NORMALLY CLOSED
NE	NEON
N/O	NORMALLY OPEN
NOP	NEGATIVE POSITIVE ZERO (ZERO TEMPERATURE COEFFICIENT)
NPN	NEGATIVE POSITIVE NEGATIVE
NSR	NOT SEPARATELY REPLACEABLE
OBD	ORDER BY DESCRIPTION
OH	OVAL HEAD
OX	OXIDE
P	PEAK
PC	PRINTED (ETCHED) CIRCUIT(S)
PF	PICOFARADS
PHL	PHILLIPS
PIV	PEAK INVERSE VOLTAGE(S)
PNP	POSITIVE NEGATIVE POSITIVE
P/O	PART OF
PORC	PORCELAIN
POS	POSITION(S)
POT	POTENTIOMETER(S)
P-P	PEAK TO PEAK
PRGM	PROGRAM
PS	POLYSTYRENE
PWV	PEAK WORKING VOLTAGE
RECT	RECTIFIER(S)
RF	RADIO FREQUENCY
RFI	RADIO FREQUENCY INTERFERENCE
RH	ROUND HEAD OR RIGHT HAND
RMO	RACK MOUNT ONLY
RMS	ROOT MEAN SQUARE
RWV	REVERSE WORKING VOLTAGE
S-B	SLOW BLOW
SCR	SILICON CONTROLLED RECTIFIER
SE	SELENIUM
SEC	SECOND(S)
SECT	SECTION(S)
SI	SILICON
SIL	SILVER
SL	SLIDE
SP	SINGLE POLE
SPL	SPECIAL
ST	SINGLE THROW
STD	STANDARD
TA	TANTALUM
TD	TIME DELAY
TFL	TEFLON
TGL	TOGGLE
THYR	THYRISTOR
TI	TITANIUM
TNLDIO	TUNNEL DIODE(S)
TOL	TOLERANCE
TRIM	TRIMMER
U	MICRO (10^{-6})
V	VOLTS
VAR	VARIABLE
VDCW	DC WORKING VOLT(S)
W	WATT(S)
W/	WITH
WIV	WORKING INVERSE VOLTAGE
W/O	WITHOUT
WW	WIREWOUND


16
4
20
9
9
15
2
21
5
24
11
4
24
18
13
14
23
9
20
3
19
10
1
9
22
9
21
9
9
9
16
17

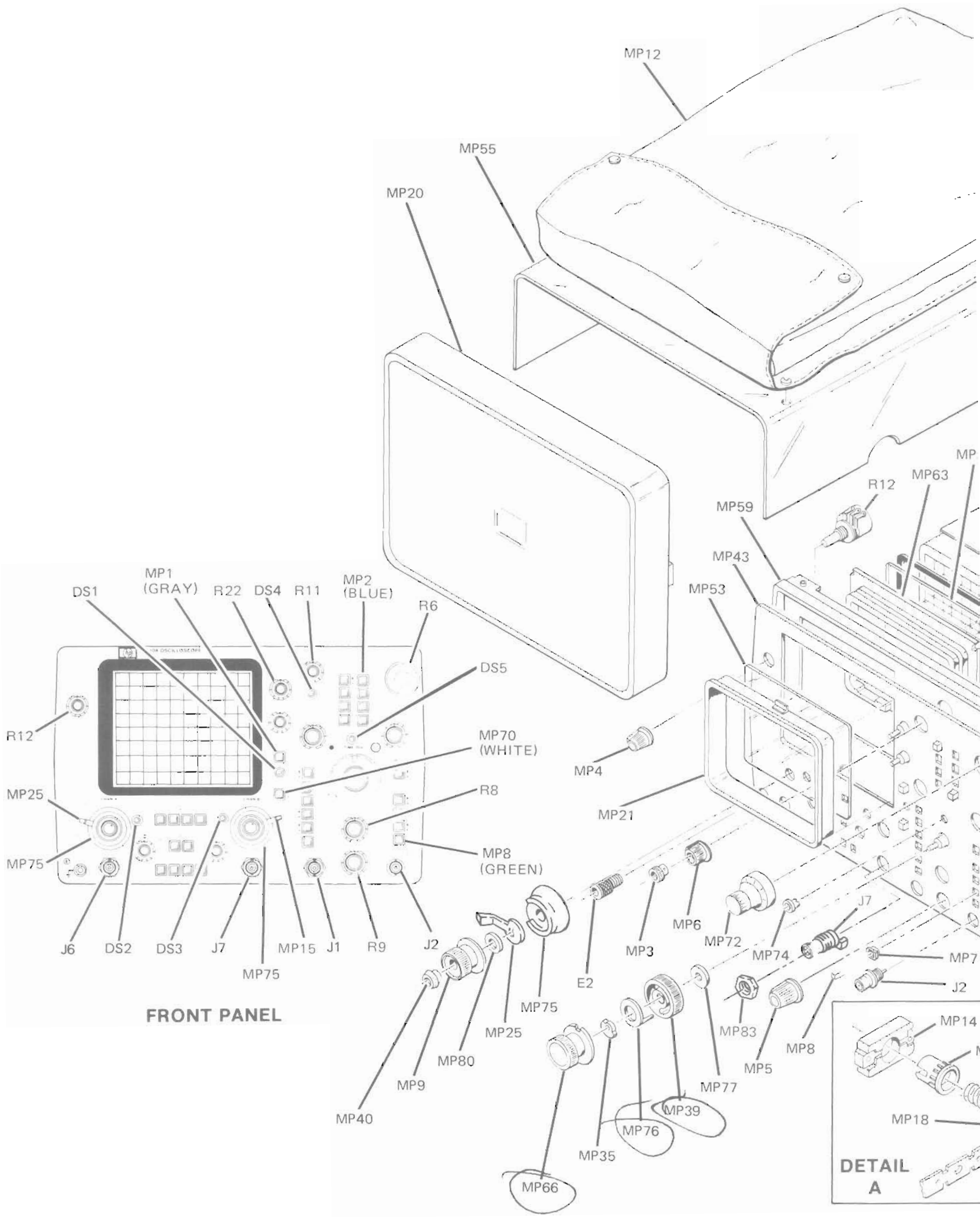
ITEM	DESCRIPTION	QTY	HP PART NO.
1	STAR WASHER	11	2190-0005
2	3/8 LOCKWASHER	13	2190-0016
3	NO. 8 HELICAL LOCKWASHER	4	2190-0017
4	NO. 6 HELICAL LOCKWASHER	8	2190-0018
5	NO. 4 HELICAL LOCKWASHER	9	2190-0019
6	1/4 LOCKWASHER (INTERNAL)	1	2190-0084
7	NO. 2 HELICAL LOCKWASHER	6	2190-0112
8	NO. 4-40 x .250 MACHINE SCREW	4	2200-0103
9	NO. 4-40 x .312 MACHINE SCREW	44	2200-0105
10	NO. 4-40 x 1.25 MACHINE SCREW	2	2200-0123
11	NO. 4-40 x .375 MACHINE SCREW	8	2200-0143
12	NO. 4-40 x .625 MACHINE SCREW	3	2200-0149
13	NO. 4-40 x .250 MACHINE SCREW (BLACK)	8	2200-0762
14	NO. 4-40 x .093 THK NUT	11	2260-0002



ITEM	DESCRIPTION	QTY	HP PART NO.
15	NO. 6-32 x 1.5 MACHINE SCREW	4	2360-0135
16	NO. 6-32 x .375 MACHINE SCREW	9	2360-0197
17	NO. 8-32 x .750 MACHINE SCREW	2	2510-0111
18	NO. 8-32 x 2.25 MACHINE SCREW	4	2510-0135
19	NO. 8-32 x .125 THK NUT	4	2580-0004
20	NO. 8 FLAT WASHER	10	3050-0071
21	3/8-32 NUT	15	2950-0043
22	1/4-32 NUT	2	2950-0072
23	NO. 4-40 x .188 SET SCREW	4	3030-0196
24	NO. 6 FLAT WASHER	11	3050-0010
25	NO. 2-56 x 3/16	2	0520-0127
26	NO. 2-56 x 5/8	4	0520-0136
27	NO. 2-28 x .500 TAPPING SCREW (HOLDS ATTENUATORS TO BOARD)	8	0624-0306
28	NO. 4-20 x 1.000 TAPPING SCREW	4	0624-0313

1740A-050-01-10-75

Figure 6-1. Chassis Parts and Board Assy Identification (Sheet 1 of 2)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MP55
MP20
MP
MP63
R12
MP59
MP43
MP53
MP4
MP21
DS1
MP1 (GRAY)
R22
DS4
R11
MP2 (BLUE)
R6
DS5
MP70 (WHITE)
R8
MP8 (GREEN)
R12
MP25
MP75
J6
DS2
DS3
J7
MP75
MP15
J1
R9
J2
FRONT PANEL
E2
MP3
MP6
MP72
MP74
J7
MP7
J2
MP75
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MP35
MP66
MP14
MP18
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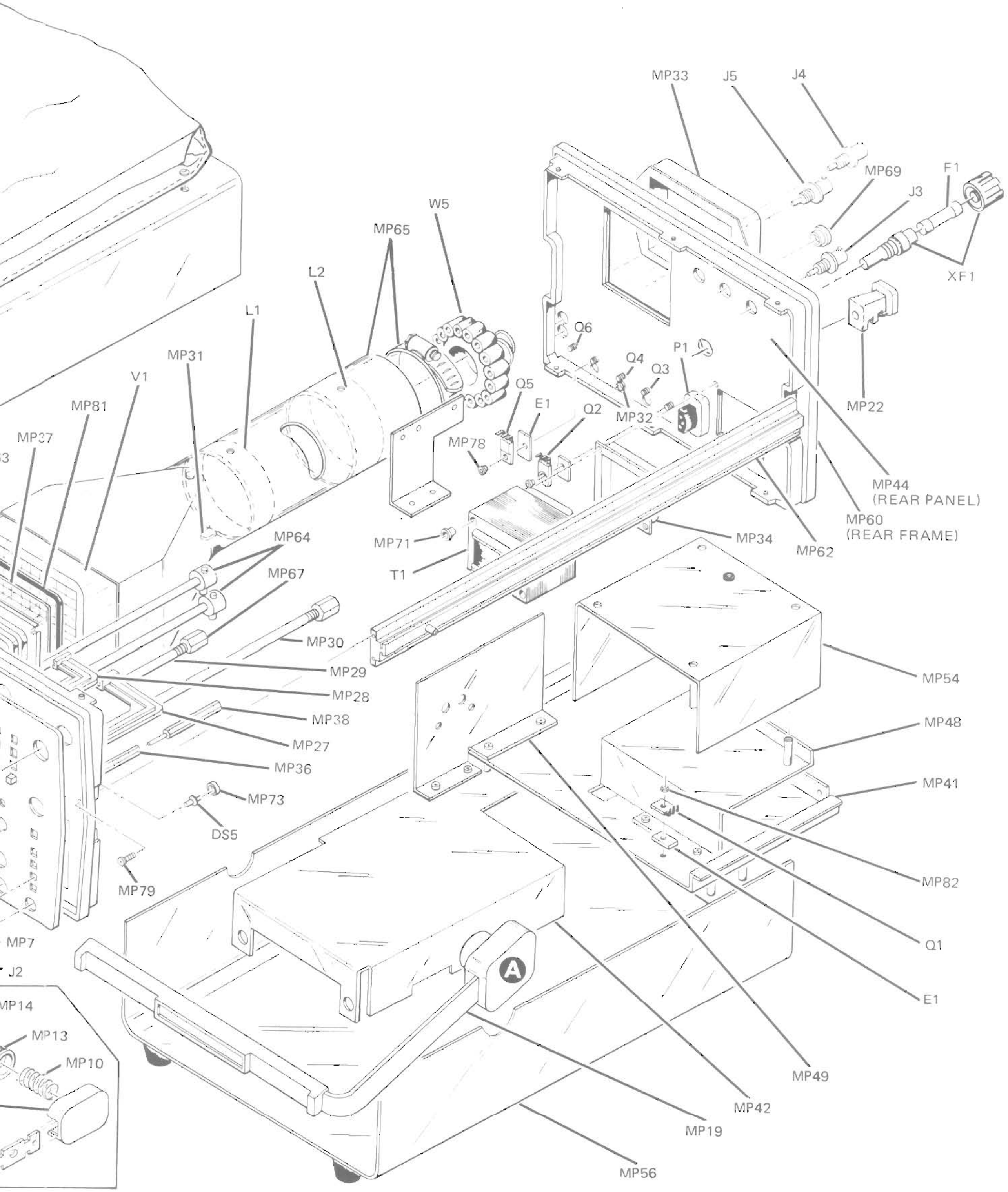

MP33
J5
J4
MP69
F1
J3
XF1
W5
MP65
L2
L1
MP31
V1
MP81
MP37
Q6
P1
Q4
Q3
Q5
E1
Q2
MP78
MP32
MP22
MP44
(REAR PANEL)
MP60
(REAR FRAME)
MP34
MP62
MP71
T1
MP64
MP67
MP30
MP29
MP28
MP38
MP27
MP36
MP73
DS5
MP79
MP54
MP48
MP41
MP82
Q1
E1
MP49
MP42
MP19
MP56
A
MP7
J2
MP14
MP13
MP10

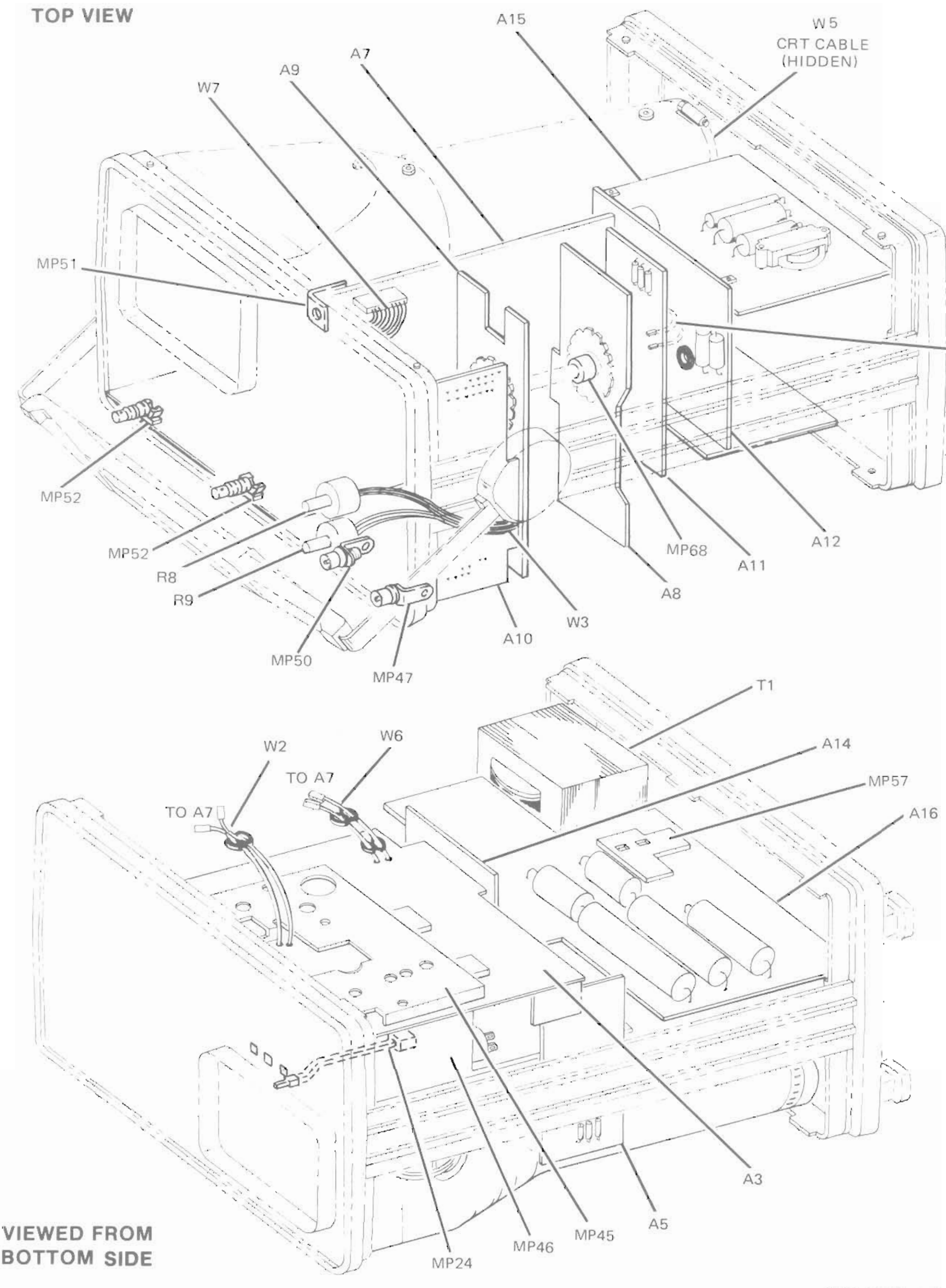

TOP VIEW
A15
W5
CRT CABLE
(HIDDEN)
A7
A9
W7
MP51
W4
MP52
MP52
R8
R9
MP68
A11
A12
A8
W3
A10
MP50
MP47
T1
W2
W6
TO A7
TO A7
A14
MP57
A16
A3
A5
MP45
MP46
MP24
VIEWED FROM
BOTTOM SIDE
1740A-050-02-07-76

Figure 6-1. Chassis Parts and Board Assy Identification (Sheet 2 of 2)

Table 6-2. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
			CHASSIS PARTS		
A1	01740-63401		ATTENUATOR ASSY, CHANNEL A	28480	01740-63401
A2	01740-63402		ATTENUATOR ASSY, CHANNEL B	28480	01740-63402
A3	01740-66515		VERTICAL PREAMPLIFIER ASSY	28480	01740-66515
A3 OPTION 101	01740-66517		VERTICAL PREAMPLIFIER ASSY - OPTION 101 ONLY	28480	01740-66517
A4	01740-61611		DELAY LINE ASSY	28480	01740-61611
A5	01740-66505		VERTICAL OUTPUT ASSY	28480	01740-66505
A6	0960-0429		HV MULTIPLIER ASSY	28480	0960-0429
A7	01740-66524		HORIZONTAL SWEEP ASSY	28480	01740-66524
A7 OPTION 101	01740-66525		HORIZONTAL SWEEP ASSY	28480	01740-66525
A8	01740-66523		MAIN SWEEP ASSY	28480	01740-66523
A9	01740-66522		DELAYED SWEEP ASSY	28480	01740-66522
A10	01740-66508		DELAYED TRIGGER ASSY	28480	01740-66508
A11	01740-66521		HORIZONTAL OUTPUT ASSY	28480	01740-66521
A12	01740-66503		GATE AMPLIFIER ASSY	28480	01740-66503
A13	01740-66516		VERTICAL CONTROL SWITCHING ASSY	28480	01740-66516
A14	01740-66504		INTERFACE ASSY	28480	01740-66504
A14 OPTION 101	01740-66514		INTERFACE ASSY-OPTION 101 ONLY	28480	01740-66514
A15	01740-66502		HV POWER SUPPLY ASSY	28480	01740-66502
A16	01740-66529		LV POWER SUPPLY ASSY	28480	01740-66529
DS1	1990-0524	1	LED-VISIBLE	28480	1990-0524
DS2	1990-0324	4	LED-VISIBLE	28480	1990-0324
DS3	1990-0324		LED-VISIBLE	28480	1990-0324
DS4	1990-0324		LED-VISIBLE	28480	1990-0324
DS5	1990-0324		LED-VISIBLE	28480	1990-0324
E1	0340-0511	1	INSULATOR-XSTR PWR TRANSISTOR .125-ID	13103	43-77-2
E2	1510-0038	1	BINDING POST-SGL 1/4-32 THD STUD	28480	1510-0038
F1	2110-0007	1	FUSE 1A 250V SLO-BLO 1.25X .25 UL	71400	MDL-1
F1	2110-0202	1	FUSE .5A 250V SLO-BLO 1.25X .25 UL	71400	MDL-V2
J1	1250-0118	8	CONNECTOR-RF BNC FEM SGL HOLE FR	9D949	31-2221-1022
J2	1250-0118		CONNECTOR-RF BNC FEM SGL HOLE FR	9D949	31-2221-1022
J3	1250-0118		CONNECTOR-RF BNC FEM SGL HOLE FR	9D949	31-2221-1022
J4	1250-0118		CONNECTOR-RF BNC FEM SGL HOLE FR	9D949	31-2221-1022
J5	1250-0118		CONNECTOR-RF BNC FEM SGL HOLE FR	9D949	31-2221-1022
J6	1250-0524	2	CONNECTOR	28480	1250-0524
J7	1250-0524		CONNECTOR	28480	1250-0524
J8	1250-0118		CONNECTOR-RF BNC FEM SGL HOLE FR (USED IN OPTION 101 ONLY)	9D949	31-2221-1022
J9	1250-0118		CONNECTOR-RF BNC FEM SGL HOLE FR (USED IN OPTION 101 ONLY)	9D949	31-2221-1022
J10	1250-0118		CONNECTOR-RF BNC FEM SGL HOLE FR (USED IN OPTION 101 ONLY)	9D949	31-2221-1022
L1	5060-0435	1	COIL:ALIGNMENT Z AXIS	28480	5060-0435
L2	00180-65601	1	COIL	28480	00180-65601
L3	9170-0016	3	CORE-SHIELDING BEAD	02114	56-590-65A1/3B
L4	9170-0016		CORE-SHIELDING BEAD	02114	56-590-65A1/3B
L5	9170-0016		CORE-SHIELDING BEAD	02114	56-590-65A1/3B
MP1	0370-0603	1	PUSHBUTTON:SQUARE, MINT GRAY	28480	0370-0603
MP2	0370-0671	1	KNOB	28480	0370-0671
MP3	0370-0963	1	KNOB-CONC-RND .5 IN JGK SGI-DECAL	28480	0370-0963
MP4	0370-1005	1	KNOB-BASE-PTR .375 IN JGK SGI-DECAL	28480	0370-1005
MP5	0370-1099	1	KNOB-BASE-PTR .5 IN JGK SGI-DECAL	28480	0370-1099
MP6	0370-1100	1	KNOB-BASE-CONC PTR .5 IN JGK	28480	0370-1100
MP7	0370-2626	1	KNOB	28480	0370-2626
MP8	0370-2630	1	KNOB	28480	0370-2630
MP9	0370-2783	1	KNOB: VOLTS/DIV	28480	0370-2783
MP10	1460-0604	1	SPRING-CPRSN .95-OD 1.185-LG MUW	28480	1460-0604
MP11	4324-0086	1	SHOCK MOUNT(CRT) BLACK	00000	OBD
MP12	1540-0292	1	CASE-ACCESSORY PVC 10.5LG 1.5WD 13.5DP	28480	1540-0292
MP13	5020-8733	1	GEAR, HUB HANDLE	28480	5020-8733
MP14	5020-8734	1	RING, HANDLE	28480	5020-8734
MP15	5020-8744	1	SPACER-DIAL CHAN A	28480	5020-8744
MP16	5020-8745	1	SPACER-DIAL CHAN B	28480	5020-8745
MP17	5040-0421	1	INSULATOR COVER:POTENTIOMETER	28480	5040-0421
MP18	5040-0511	1	CAP, TRIM	28480	5040-0511
MP19	5040-0515	1	ASSY, HANDLE	28480	5040-0515
MP20	01740-64101	1	COVER, PANEL	28480	01740-64101
MP21	5040-0521	1	BEZEL, CRT	28480	5040-0521
MP22	5040-7829	1	FOOT	28480	5040-7829
MP23			NOT ASSIGNED		
MP24	5040-7023	1	PUSH ROD	28480	5040-7023
MP25	5040-7598	1	LEVER, COUPLING	28480	5040-7598
MP26			NOT ASSIGNED		
MP27	5040-7705	4	EXTENDER-PUSHBUTTON	28480	5040-7705
MP28	5040-7706	4	EXTENDER-PUSHBUTTON	28480	5040-7706
MP29	5040-7755	1	EXTENDER-PUSHBUTTON	28480	5040-7755

See introduction to this section for ordering information

Table 6-2. Replaceable Parts (Cont'd)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
MP30	5040-7756	1	EXTENDER-PUSHBUTTON	28480	5040-7756
MP31	00180-01218	2	BRACKET-COIL	28480	00180-01218
MP32	6960-0001	1	PLUG-HOLE FL-HD .375-DIA STL	57771	D-3005-LCS
MP33	01701-04108	1	COVER-CRT	28480	01701-04108
MP34	01710-04103	1	COVER-TRANSFORMER	28480	01710-04103
MP35	01720-22501	1	RING-ANTIRUN	28480	01720-22501
MP36	01720-23705	1	SHAFT-DELAYED SWEEP	28480	01720-23705
MP37	01740-20601	1	SHIELD-CRT SAFETY	28480	01740-20601
MP38	01720-63703	1	SHAFT ASSY, MAIN SWEEP	28480	01720-63703
MP39	01720-67403	1	KNOB, DELAYED TIME/DIV	28480	01720-67403
MP40	01720-67405	2	KNOB-VERNIER	28480	01720-67405
MP41	01740-00101	1	DECK, MAIN	28480	01740-00101
MP42	01740-00102	1	DECK, FRONT	28480	01740-00102
MP43	01740-00202	1	PANEL, FRONT	28480	01740-00202
MP44	01740-00205	1	PANEL, REAR	28480	01740-00205
MP45	01740-00601	1	SHIELD, PREAMPLIFIER	28480	01740-00601
MP46	01740-00602	1	SHIELD, CAL	28480	01740-00602
MP47	01740-01201	1	BRACKET, DELAYED TRIGGER	28480	01740-01201
MP48	01740-01202	1	BRACKET, HV	28480	01740-01202
MP49	01740-01203	1	BRACKET, VERTICAL OUTPUT	28480	01740-01203
MP50	01740-01204	1	BRACKET, HORIZONTAL SWEEP	28480	01740-01204
MP51	01740-01209	1	BRACKET, HORIZONTAL TOP	28480	01740-01209
MP52	01740-01212	1	BRACKET, BNC	28480	01740-01212
MP53	01740-02701	1	FILTER, CONTRAST	28480	01740-02701
MP54	01740-04101	1	COVER, HV	28480	01740-04101
MP55	01740-04102	1	COVER, TOP	28480	01740-04102
MP56	01740-04108	1	COVER, BOTTOM	28480	01740-04108
MP57	01740-04109	1	COVER, LINE VOLTAGE (ON A16)	28480	01740-04109
MP58			NOT ASSIGNED		
MP59	01740-20501	1	FRAME, FRONT	28480	01740-20501
MP60	01740-20507	1	FRAME, REAR	28480	01740-20507
MP61	01740-20503	1	HEAT SINK, PREAMPLIFIER	28480	01740-20503
MP62	01740-23701	1	RAIL, SIDE	28480	01740-23701
MP63	01740-24702	1	SUPPORT, CRT CAMERA	28480	01740-24702
MP64	01740-43901	1	SHAFT, EXTENSION	28480	01740-43901
MP65	01740-60601	1	SHIELD ASSY, CRT	28480	01740-60601
MP66	01740-67402	1	KNOB, MAIN TIME/DIV	28480	01740-67402
MP67	01830-23201	1	COUPLER, SWITCH EXTENSION	28480	01830-23201
MP68	0510-0541	3	COLLAR SHAFT	28480	0510-0541
MP69	1410-0094	1	BUSHING, PANEL	28480	1410-0094
MP70	0370-2862	1	PUSHBUTTON-WHITE	28480	0370-2862
MP71			NOT ASSIGNED		
MP72	1140-0036	1	DIAL, DELAY	12697	461
MP73	1400-0665	1	BEZEL:LED	28480	1400-0665
MP74			NOT ASSIGNED		
MP75	0370-0684	1	PUSHBUTTON-GOLD (USED IN OPTION 101 ONLY)	28480	0370-0684
MP76	5040-5952	1	FLOATING CORE	28480	5040-5952
MP77	3050-0481	1	WASHER	28480	3050-0481
MP78	3050-0791		WASHER-SHOULDER	28480	3050-0791
MP79	0624-0279		SCREW: SPECIAL	28480	0624-0279
MP80	3050-0655		WASHER	28480	3050-0655
MP81	01740-24701		SPACER	28480	01740-24701
MP82	2190-0910		DOME WASHER	28480	2190-0910
MP83	2950-0035	2	NUT:CONNECTOR	28480	2950-0035
MP84 (OPTION 101)	01720-03201	1	ADAPTER:POWER CORD	28480	01720-03201
P1	1251-2357	1	CONNECTOR-AC PWR HP-9 MALE FLG MTG	28480	1251-2357
Q1	1854-0433	1	TRANSISTOR NPN SI PD=90W FT=2MHZ	28480	1854-0433
Q2	1854-0573	1	TRANSISTOR NPN SI PD=30W FT=10MHZ	28480	1854-0573
Q3	1854-0370	4	TRANSISTOR NPN 2N5294 SI PD=1.8W	02735	2N5294
Q4	1854-0370		TRANSISTOR NPN 2N5294 SI PD=1.8W	02735	2N5294
Q5	1854-0370		TRANSISTOR NPN 2N5294 SI PD=1.8W	02735	2N5294
Q6	1854-0370		TRANSISTOR NPN 2N5294 SI PD=1.8W	02735	2N5294
R1	0684-4711	1	RESISTOR 470 10% .25W FC TC=–400/+600 (USED IN OPTION 101 ONLY)	01121	CB4711
R2			NOT ASSIGNED		
R3	0683-4705	2	RESISTOR 47 5% .25W FC TC=–400/+500	01121	CB4705
R4	0683-4705		RESISTOR 47 5% .25W FC TC=–400/+500	01121	CB4705
R5	0683-1505		RESISTOR 15 5% .25W FC TC=–400/+500	01121	CB1505
R6	2100-1443	1	RESISTOR-VAR PREC WW 10-TRN 50K 3%	28480	2100-1443
R7	0684-1021	1	RESISTOR 1K 10% .25W FC TC=–400/+600	01121	CB1021
R8	2100-0657	1	RESISTOR-VAR W/SW 100K 30% LIN	28480	2100-0657
R9	2100-3397	1	RESISTOR-VAR W/SW 200K 20% 10CW SPST-NC	28480	2100-3397
R10	0683-1505		RESISTOR 15 5% .25W FC TC =–400/+500	01121	CB1505
R11	2100-3014	1	RESISTOR-VAR DUAL 20K-20%-CC 20K-20%-C	28480	2100-3014
R12	2100-3471	1	RESISTOR-VAR 100 OHM 20% C	11236	551
T1	9100-3499	1	TRANSFORMER-POWER	28480	9100-3499
V1	5083-3552	1	CRT:P31 ALIGNMENT	28480	5083-3552
W1	8120-1521	1	CABLE ASSY 3-COND 18-AWG	28480	8120-1521
W1(OPTION 101)	8120-1202	1	CABLE ASSY:POWER 7.5 FT.	28480	8120-1202
W2	01740-61602	1	CABLE ASSY, SYNC	28480	01740-61602
W3	01740-61621	1	CABLE ASSY, FRONT PANEL	28480	01740-61621
W4	01740-61603	1	CABLE ASSY, HORIZONTAL OUTPUT	28480	01740-61603
W5	01740-61601	1	CABLE ASSY, CRT (INCLUDES XV1)	28480	01740-61601
W6	01740-61609	1	CABLE ASSY, TRIGGER VIEW	28480	01740-61609
W7	01740-61622	1	CABLE ASSY:HORIZ POS/D	28480	01740-61622
W8	01740-61623	1	CABLE ASSY:CRT/SCALE	28480	01740-61623
XF1	1400-0084	1	FUSEHOLDER:EXTRACTION POST TYPE	75915	342014

Table 6-2. Replaceable Parts (Cont'd)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A1	01740-63401	1	ATTENUATOR ASSEMBLY, CHANNEL A	28480	01740-63401
A1R1	2100-3551	2	RESISTOR-VAR W/SW 100 10% LIN SPST-NO	28480	2100-3551
A2	01740-63402	1	ATTENUATOR ASSEMBLY, CHANNEL B	28480	01740-63402
A2R1	2100-3551		RESISTOR-VAR W/SW 100 10% LIN SPST-NO	28480	2100-3551
A3	01740-66515	1	BOARD ASSY, VERTICAL PREAMPLIFIER (DOES NOT INCLUDE A3A1)	28480	01740-66515
A3 OPTION 101	01740-66517	1	BOARD ASSEMBLY, VERTICAL PREAMPLIFIER (USES SAME PARTS AS 01740-66515 EXCEPT WHERE NOTED)	28480	01740-66517
A3A1	5081-3030	1	ASSEMBLY, SUBSTRATE (NOT SUPPLIED WITH A3, ORDER SEPARATELY)	28480	5081-3030
A3C1	0160-4204	2	CAPACITOR-FXD .033UF +-10% 500WVDC CER	72982	8131-M500-W5R-333K
A3C2	0121-0060	4	CAPACITOR-V TRMR-CER 2/8PF 350V PC-MTG	0086S	304322 2/8PF NPO
A3C3	0150-0021	3	CAPACITOR-FXD .47PF +-5% 500WVDC TI DIOX	95121	TYPE QC
A3C4	0121-0060		CAPACITOR-V TRMR-CER 2/8PF 350V PC-MTG	0086S	304322 2/8PF NPO
A3C5	0160-2150	1	CAPACITOR-FXD 33PF +-5% 300WVDC MICA	28480	0160-2150
A3C6	0160-3448	3	CAPACITOR-FXD 1000PF +-10% 1000WVDC CER	28480	0160-3448
A3C7	0160-3799	3	CAPACITOR-FXD +-10% 100WVDC CER 18 PF	28480	0160-3799
A3C8	0160-3451	26	CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A3C9	0180-2255	13	C:FXD TA ELECT 22 UF 20% 20VDCW	72982	301-000-COHO-829C
A3C10	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A3C11	0180-0648	2	CAPACITOR-FXD 0.1UF 35WVDC	28480	0180-0648
A3C12	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A3C13	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A3C14	0160-4204		CAPACITOR-FXD .033UF +-10% 500WVDC CER	72982	8131-M500-W5R-333K
A3C15	0160-3567	2	CAPACITOR-FXD 10PF +-5% 100WVDC CER	28480	0160-3567
A3C16	0160-3448		CAPACITOR-FXD 1000PF +-10% 1000WVDC CER	28480	0160-3448
A3C17	0121-0060		CAPACITOR-V TRMR-CER 2/8PF 350V PC-MTG	0086S	304322-2/8PF NPO
A3C18	0150-0021		CAPACITOR-FXD .47PF +-5% 500WVDC TI DIOX	95121	TYPE QC
A3C19	0121-0060		CAPACITOR-V TRMR-CER 2/8PF 350V PC-MTG	0086S	304322 2/8PF NPO
A3C20	0160-2198	4	CAPACITOR-FXD 20PF +-5% 300WVDC MICA	28480	0160-2198
A3C21	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A3C22	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A3C23	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A3C24	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A3C25	0180-0648		CAPACITOR-FXD 0.1UF 35WVDC	28480	0180-0648
A3C26	0160-3443	4	CAPACITOR-FXD .1UF +80-20% 50WVDC CER	28480	0160-3443
A3C27	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A3C28	0160-3451		CAPACITOR-FXD .01UF +80-10% 100WVDC CER	28480	0160-3451
A3C29	0180-2255		C:FXD TA ELECT 22 UF 20% 20VDCW	72982	301-000-COHO-829C
A3C30	0160-3443		CAPACITOR-FXD .1UF +80-20% 50WVDC CER	28480	0160-3443
A3C31	0160-3567		CAPACITOR-FXD 10PF +-5% 100WVDC CER	28480	0160-3567
A3C32	0160-3470	3	CAPACITOR-FXD .01UF +80-20% 50WVDC CER	28480	0160-3470
A3C33	0180-2255		C:FXD TA ELECT 22 UF 20% 20VDCW	72982	301-000-COHO-829C
A3C34	0180-2255		C:FXD TA ELECT 22 UF 20% 20VDCW	72982	301-000-COHO-829C
A3C35	0180-2255		C:FXD TA ELECT 22 UF 20% 20VDCW	72982	301-000-COHO-829C
A3C36	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A3C37	0160-4324	2	CAPACITOR-FXD 220PF +-10% 50WVDC CER	6F364	TYPE 100-100-X7R-221K
A3C38	0160-4324		CAPACITOR-FXD 220PF +-10% 50WVDC CER	6F364	TYPE 100-100-X7R-221K
A3C39	0150-0061	1	CAPACITOR-FXD 20PF +-10% 100WVDC CER	28480	0150-0061
A3C40	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A3C41	0180-2255		C:FXD TA ELECT 22 UF 20% 20VDCW	72982	301-000-COHO-829C
A3C42	0180-2255		C:FXD TA ELECT 22 UF 20% 20VDCW	72982	301-000-COHO-829C
A3C43	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A3C44	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A3C45	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A3C46	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A3C47	0160-2217	1	CAPACITOR-FXD 910PF +-5% 300WVDC MICA	28480	0160-2217
A3C48	0180-0228	4	CAPACITOR-FXD 22UF +-10% 15VDC TA-SOLID	56289	150D226X9015B2
A3C49	0160-2207	1	CAPACITOR-FXD 300PF +-5% 300WVDC MICA	28480	0160-2207
A3C50	0180-2255		C:FXD TA ELECT 22 UF 20% 20VDCW	72982	301-000-COHO-829C
A3C51	0160-0820	4	CAPACITOR-FXD .05UF +80-20% 25WVDC CER	28480	0160-0820
A3C52	0180-2255		C:FXD TA ELECT 22 UF 20% 20VDCW	72982	301-000-COHO-829C
A3C53	0160-3466	3	CAPACITOR-FXD 100PF +-10% 1000WVDC CER	28480	0160-3466
A3C54	0160-3466		CAPACITOR-FXD 100PF +-10% 1000WVDC CER	28480	0160-3466
A3C55	0160-3466		CAPACITOR-FXD 100PF +-10% 1000WVDC CER	28480	0160-3466
A3C56	0160-0820		CAPACITOR-FXD .05UF +80-20% 25WVDC CER	28480	0160-0820
A3C57	0180-0228		CAPACITOR-FXD 22UF +-10% 15VDC TA-SOLID	56289	150D226X9015B2
A3C58	0180-2255		C:FXD TA ELECT 22 UF 20% 20VDCW	72982	301-000-COHO-829C
A3C59	0160-0820		CAPACITOR-FXD .05UF +80-20% 25WVDC CER	28480	0160-0820
A3C60	0180-0228		CAPACITOR-FXD 22UF +-10% 15VDC TA-SOLID	56289	150D226X9015B2
A3C61	0160-0820		CAPACITOR-FXD .05UF +80-20% 25WVDC CER	28480	0160-0820
A3C62	0180-0228		CAPACITOR-FXD 22UF +-10% 15VDC TA-SOLID	56289	150D226X9015B2
A3C63	0180-2255		C:FXD TA ELECT 22 UF 20% 20VDCW	72982	301-000-COHO-829C
A3C64	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A3C65	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A3C66	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A3C67	0160-3448		CAPACITOR-FXD 1000PF +-10% 1000WVDC CER	28480	0160-3448
A3C68	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A3C69	0160-3470		CAPACITOR-FXD .01UF +80-20% 50WVDC CER	28480	0160-3470

Table 6-2. Replaceable Parts (Cont'd)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A3C70	0160-3470		CAPACITOR-FXD .01UF +80–20% 50WVDC CER	28480	0160-3470
A3C71	0160-3451		CAPACITOR-FXD .01UF +80–20% 100WVDC CER	28480	0160-3451
A3C72	0160-3451		CAPACITOR-FXD .01UF +80–20% 100WVDC CER	28480	0160-3451
A3C73	0140-0192	3	CAPACITOR-FXD 68PF +–5% 300WVDC MICA	72136	DM15E680J0300WV1CR
A3C74	0150-0031	1	CAPACITOR-FXD 2PF +–5% 500WVDC TI DIOX	95121	TYPE QC
A3C75	0160-3451		CAPACITOR-FXD .01UF +80–20% 100WVDC CER	28480	0160-3451
A3C76	0160-3451		CAPACITOR-FXD .01UF +80–20% 100WVDC CER	28480	0160-3451
A3C77	0160-3451		CAPACITOR-FXD .01UF +80–20% 100WVDC CER (NOT USED IN OPTION 101)	28480	0160-3451
A3C78	0160-3451		CAPACITOR-FXD .01UF +80–20% 100WVDC CER	28480	0160-3451
A3CR1	1901-0040	16	DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR2			NOT ASSIGNED		
A3CR3			NOT ASSIGNED		
A3CR4	1901-0047	8	DIODE-SWITCHING 20V 75NA 10NS	28480	1901-0047
A3CR5	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR6	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR7	1901-0047		DIODE-SWITCHING 20V 75NA 10NS	28480	1901-0047
A3CR8	1901-0047		DIODE-SWITCHING 20V 75NA 10NS	28480	1901-0047
A3CR9	1901-0047		DIODE-SWITCHING 20V 75NA 10NS	28480	1901-0047
A3CR10			NOT ASSIGNED		
A3CR11	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR12	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR13	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR14	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR15	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR16	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR17	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR18	1910-0016	1	DIODE-SWITCHING 60V 60MA 1NS	28480	1910-0016
A3CR19	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR20	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR21	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR22			NOT ASSIGNED		
A3CR23	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR24			NOT ASSIGNED		
A3CR25	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR26	1901-0045	2	DIODE-PWR RECT 100V 750NA DO-29	28480	1901-0045
A3CR27	1901-0045		DIODE PWR RECT 100V 750NA DO-29	28480	1901-0045
A3CR28	1906-0042		DIODE-MULT (NOT USED IN OPTION 101)	28480	1906-0042
A3CR29			NOT ASSIGNED		
A3L1	9100-0670	2	INDUCTOR	28480	9100-0670
A3L2	9100-0670		INDUCTOR	28480	9100-0670
A3L3	9100-2264	2	COIL-FXD MOLDED RF CHOKE 6.8UH 10%	24226	10/681
A3L4	9100-2264		COIL-FXD MOLDED RF CHOKE 6.8UH 10%	24226	10/681
A3L5	9100-1650	2	COIL-FXD MOLDED RF CHOKE 680UH 5%	24226	19/683
A3L6	9100-1650		COIL-FXD MOLDED RF CHOKE 680UH 5%	24226	19/683
A3L7	9170-0029	1	CORE:SHIELDING BEAD	02114	56-590-65A2/4A
A3MP1	01740-00603	1	SHIELD-RESISTOR	28480	01740-00603
A3P2	1251-3750	3	CONNECTOR 10-PIN M POST TYPE	27264	09-65-1101
A3P3	1251-3904	2	CONNECTOR POST TYPE	28480	1251-3904
A3P4	1251-3904		CONNECTOR POST TYPE	28480	1251-3904
A3Q1	1853-0380	5	TRANSISTOR PNP SI TO-92 PD=350MW	28480	1853-0380
A3Q2	1855-0217	2	TRANSISTOR-JFET DUAL N-CHAN D-MODE SI	28480	1855-0217
A3Q3	1853-0380		TRANSISTOR PNP SI TO-92 PD=350MW	28480	1853-0380
A3Q4	1855-0217		TRANSISTOR-JFET DUAL N-CHAN D-MODE SI	28480	1855-0217
A3Q5	1854-0092	11	TRANSISTOR NPN SI PD=200MW FT=600MHZ	28480	1854-0092
A3Q6	1854-0628	2	TRANSISTOR NPN SI TO-92 PD=625MW	04713	MPS-H17
A3Q7	1854-0628		TRANSISTOR NPN SI TO-92 PD=625MW	04713	MPS-H17
A3Q8	1854-0215	19	TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A3Q9	1853-0036	23	TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A3Q10	1854-0092		TRANSISTOR NPN SI PD=200MW FT=600MHZ	28480	1854-0092
A3Q11	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A3Q12	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A3Q13	1855-0367	1	TRANSISTOR-UJT P ON N	28480	1855-0367
A3Q14	1854-0071	14	TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A3Q15	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A3Q16	1853-0015	3	TRANSISTOR PNP SI PD=200MW FT=500MHZ	28480	1853-0015
A3Q17	1853-0006	1	TRANSISTOR PNP 2N3134 SI TO-5 PD=600MW	04713	2N3134
A3Q18	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A3Q19	1854-0213	1	TRANSISTOR NPN 2N2538 SI TO-5 PD=800MW	28480	1854-0213
A3Q20	1853-0086	1	TRANSISTOR PNP SI PD=310MW FT=40MHZ	28480	1853-0086
A3Q21	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ (NOT USED IN OPTION 101)	28480	1853-0036
A3R1	0698-8648	2	RESISTOR 50 2% .5W MO TC=0+–150	28480	0698-8648
A3R2	0698-7206	1	RESISTOR 56.2 2% .05W F TC=0+–100	24546	C3-1/8-T00-56R2-G
A3R3	0698-8622	4	RESISTOR 990K 5% .12WF	28480	0698-8622
A3R4	0698-3329	3	RESISTOR 10K .5% .125W F TC=0+–100	03888	PME55-1/8-T0-1002-D
A3R5	0698-8622		RESISTOR 990K 5% .12WF	28480	0698-8622
A3R6	0675-1011	2	RESISTOR 100 10% .125W CC TC=0+882	01121	BB1011

See introduction to this section for ordering information

Table 6-2. Replaceable Parts (Cont'd)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A3R7	0698-7214	1	RESISTOR 121 2% .05W F TC=0+-100 (FACTORY SELECTED VALUE)	24546	C3-1/8-T0-121R-G
A3R8	0687-2241	2	RESISTOR 220K 10% .5W CC TC=0+882	01121	EB2241
A3R9	0757-0401	10	RESISTOR 100 1% .125W	24546	C4-1/8-T0-101-F
A3R10	0698-3157	4	RESISTOR 19.6K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1962-F
A3R11	2100-0568	7	RESISTOR-VAR TRMR 100 OHM 10% C TOP ADJ	73138	72PR100
A3R12	0684-1001	2	RESISTOR 10 10% .25W CC	01121	CB1001
A3R13	0683-0475	2	RESISTOR 4.7 5% .25W FC TC=-400/+500	01121	CB47G5
A3R14	0757-0394	4	RESISTOR 51.1 1% .12W F	24546	C4-1/8-T0-51R1-F
A3R15	0698-7926	2	RESISTOR 470 10% .125W CC TC=0+-882	01121	BB4711
A3R16	0757-0394		RESISTOR 51.1 1% .12W F	24546	C4-1/8-T0-51R1-F
A3R17	0698-3157		RESISTOR 19.6K 1% .125W F TC=+-100	16299	C4-1/8-T0-1962-F
A3R18	2100-3531	2	RESISTOR-VAR TRMR 250 OHM 10% C	73138	72-177-0
A3R19	2100-3531		RESISTOR-VAR TRMR 250 OHM 10%	73138	72-177-0
A3R20	0757-3438	2	RESISTOR 147 1% .125W F	28480	0757-3438
A3R21	0698-8648		RESISTOR 50 2% .5W MO TC=0+-150	28480	0698-8648
A3R22	2100-2061	1	RESISTOR-TRMR 200 10% C TOP-ADJ 1-TURN	30983	ET50W201
A3R23	0698-8622		RESISTOR 990K 5% .12W F	28480	0698-8622
A3R24	0698-3329		RESISTOR 10K .5% .125W F TC=0+-100	03888	PME55-1/8-T0-1002-D
A3R25	0698-8622		RESISTOR 990K 5% .12W F	28480	0698-8622
A3R26	0687-2241		RESISTOR 220K 10% .5W CC TC=0+882	01121	EB2241
A3R27	0675-1011		RESISTOR 100 10% .125W CC TC=0+882	01121	BB1011
A3R28	0698-7216	1	RESISTOR 147 2% .05W F TC=0+-100 (FACTORY SELECTED VALUE)	24546	C3-1/8-T0-147R-G
A3R29	0757-0401		RESISTOR 100 1% .125W F	24546	C4-1/8-T0-101-F
A3R30	0698-3157		RESISTOR 19.6K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1962-F
A3R31	2100-0568		RESISTOR-VAR TRMR 100 OHM 10% C TOP ADJ	73138	72PR100
A3R32	2100-3212	2	RESISTOR-VAR TRMR 200 OHM 10% C	73138	72-PR200
A3R33	0698-0082	3	RESISTOR 464 1% .125W F TC=0+-100	16299	C4-1/8-T0-4640-F
A3R34	0698-3495	2	RESISTOR 866 1% .125W F	16299	C4-1/8-T0-866R-F
A3R35	0757-0403		RESISTOR 121 1% .125W F TC=0+-100	24546	C4-1/8-T0-121R-F
A3R36	2100-3433	2	RESISTOR-VAR CONTROL CC 250 10% LIN	01121	70M1G040R251U
A3R37	0698-0082		RESISTOR 464 1% .125W F TC=0+-100	16299	C4-1/8-T0-4640-F
A3R38	0757-1098	2	RESISTOR 945 1% .125W F TC=0+-100	24546	C4-1/8-T0-945R-F
A3R39	0684-1001		RESISTOR 10 10% .25 CC	01121	CB1001
A3R40	0757-0394		RESISTOR 51.1 1% .125W F	24546	C4-1/8-T0-51R1-F
A3R41	0757-0284	2	RESISTOR 150 1% .125W F	24546	C4-1/8-T0-151-F
A3R42	0757-0398	2	RESISTOR 75 1% .125W F	24546	75RO-F
A3R43	0698-7926		RESISTOR 470 10% .125W CC TC=0+-882	01121	BB4711
A3R44	0684-0271	3	RESISTOR 2.7 10% .25W CC	01121	CB27G1
A3R45	0757-0433	14	RESISTOR 3.32K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3321-F
A3R46	2100-0554	4	RESISTOR-VAR TRMR 500 OHM 10% C TOP ADJ	73138	72PR500
A3R47	0757-0394		RESISTOR 51.1 1% .125W F	24546	C4-1/8-T0-51R1-F
A3R48	0698-3157		RESISTOR 19.6K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1962-F
A3R49	2100-0554		RESISTOR-VAR TRMR 500 OHM 10% C TOP ADJ	73138	72PR500
A3R50	0757-0398		RESISTOR 75 1% .125W F	24546	75RO-F
A3R51	0757-0284		RESISTOR 150 1% .125W F	24546	C4-1/8-T0-151-F
A3R52	0684-0271		RESISTOR 2.7 10% .25W CC	01121	CB27G1
A3R53	0757-0433		RESISTOR 3.32K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3321-F
A3R54	0698-7216	2	RESISTOR 147 2% .05W F	24546	C3-1/8-T0-147R-G
A3R55	0698-7216		RESISTOR 147 2% .05W F	24546	C3-1/8-T0-147R-G
A3R56	0757-1098		RESISTOR 945 1% .125W F TC=0+-100	24546	C4-1/8-T0-945R-F
A3R57	0698-3495		RESISTOR 866 1% .125W F	16299	C4-1/8-T0-866R-F
A3R58	2100-3212		RESISTOR VAR TRMR 200 OHM 10% C	32997	3389P-1-201
A3R59	0698-7228	2	RESISTOR 464 2% .05W F TC=0+-100	24546	C3-1/8-T0-464R-G
A3R60	0698-7228		RESISTOR 464 2% .05W F TC=0+-100	24546	C3-1/8-T0-464R-G
A3R61	2100-3433		RESISTOR-VAR CONTROL CC 250 10% LIN	01121	70M1G040R251U
A3R62	0757-0403		RESISTOR 121 1% .125W F TC=0+-100	24546	C4-1/8-T0-121R-F
A3R63	0757-0411	6	RESISTOR 332 1% .125W F TC=0+-100	24546	C4-1/8-T0-332R-F
A3R64	0757-0401		RESISTOR 100 1% .125W F TUBULAR	24546	C4-1/8-T0-101-F
A3R65	2100-0567	2	RESISTOR-VAR TRMR 2K OHM 10% C TOP ADJ	73138	72PR2K
A3R66	0757-0401		RESISTOR 100 1% .125W F TUBULAR	24546	C4-1/8-T0-101-F
A3R67	0698-3455	2	RESISTOR 261K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2613-F
A3R68	0684-4721	2	RESISTOR 4.7K 10% .25W CC	01121	CB4721
A3R69	0684-1031	9	RESISTOR 10K 10% .25W CC	01121	CB1031
A3R70	0757-0462	2	RESISTOR 75K 1% .125W F TC=0+-100	24546	C4-1/8-T0-7502-F
A3R71	0684-4721		RESISTOR 4.7K 10% .25W CC	01121	CB4721
A3R72	0698-3161	3	RESISTOR 38.3K 1% .125W F TC=0+-100	16299	C4-1/8-T0-3832-F
A3R73	0684-1031		RESISTOR 10K 10% .25W CC	01121	CB1031
A3R74	0757-0739	1	RESISTOR 2K 1% .25W F (FACTORY SELECTED VALUE)	24546	C5-1/8-T0-2001-F
A3R75	0698-3161		RESISTOR 38.3K 1% .125W F TC=0+-100	16299	C4-1/8-T0-3832-F
A3R76	2100-3531		RESISTOR-VAR TRMR 250 OHM 10% C	73138	72-177-0
A3R77	2100-3531		RESISTOR-VAR TRMR 250 OHM 10% C	73138	72-177-0
A3R78	0757-3438		RESISTOR 147 1% .125W F	24546	C4-1/8-T0-121R-F
A3R79	2100-3212		RESISTOR-VAR TRMR 200 OHM 10% C TOP ADJ	73138	72PR200
A3R80	0757-0290	2	RESISTOR 6.19K 1% .125W F	19701	MF4C1/8-TD-6191-F
A3R81	0757-0417	2	RESISTOR 562 1% .125W F TC=0+-100	24546	C4-1/8-T0-562R-F

Table 6-2. Replaceable Parts (Cont'd)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A3R82	0757-0443	3	RESISTOR 11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1102-F
A3R83	0698-4037	3	RESISTOR 46.4 1% .125W F TC=0+-100	16299	C4-1/8-T0-46R4-F
A3R84	0757-0317	1	RESISTOR 1.33K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1331-F
A3R85	0698-4037		RESISTOR 46.4 1% .125W F TC=0+-100	16299	C4-1/8-T0-46R4-F
A3R86	2100-0567		RESISTOR-VAR TRMR 2K OHM 10% C TOP ADJ	73138	72PR2K
A3R87	0757-0433		RESISTOR 3.32K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3321-F
A3R88	0757-0280	5	RESISTOR 1K 1% .125W F	24546	C4-1/8-T0-1001-F
A3R89	0757-1094	3	RESISTOR 1.47K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1471-F
A3R90	2100-3212		RESISTOR-VAR TRMR 200 OHM 10% C TOP ADJ	73138	72PR200
A3R91	0684-1031		RESISTOR 10K 10% .25W CC	01121	CB1031
A3R92	0684-1031		RESISTOR 10K 10% .25W CC	01121	CB1031
A3R93	0698-3161		RESISTOR 38.3K 1% .125W F TC=0+-100	16299	C4-1/8-T0-3832-F
A3R94	0684-3321		RESISTOR 3.3K 10% .25W CC	01121	CB3321
A3R95	0684-1031		RESISTOR 10K 10% .25W CC	01121	CB1031
A3R96	0757-1094		RESISTOR 1.47K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1471-F
A3R97	0684-1031		RESISTOR 10K 10% .25W CC	01121	CB1031
A3R98	0684-1031		RESISTOR 10K 10% .25W CC	01121	CB1031
A3R99	0698-0082		RESISTOR 464 1% .125W F TC=0+-100	16299	C4-1/8-T0-4640-F
A3R100	0698-3455		RESISTOR 261K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2613-F
A3R101	0757-0401		RESISTOR 100 1% .125W F	24546	C4-1/8-T0-101-F
A3R102	0684-1031		RESISTOR 10K 10% .25W CC	01121	CB1031
A3R103	0757-0433		RESISTOR 3.32K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3321-F
A3R104	0757-0442		RESISTOR 10K 1% .125W F	24546	C4-1/8-T0-1002-F
A3R105	0684-3321		RESISTOR 3.3K 10% .25W CC	01121	CB3321
A3R106	0757-0283	3	RESISTOR 2K 1% .125W F	24546	C4-1/8-T0-2001-F
A3R107	0684-3321		RESISTOR 3.3K 10% .25W CC	01121	CB3321
A3R108	0684-1031		RESISTOR 10K 10% .25W CC	01121	CB1031
A3R109	0757-0280		RESISTOR 1K 1% .125W F	24546	C4-1/8-T0-1001-F
A3R110	0757-0274	2	RESISTOR 1.21K 1% .125W F	24546	C4-1/8-T0-1213-F
A3R111	0757-0280		RESISTOR 1K 1% .125W F	24546	C4-1/8-T0-1001-F
A3R112	0757-0274		RESISTOR 1.21K 1% .125W F	24546	C4-1/8-T0-1213-F
A3R113	0684-3321		RESISTOR 3.3K 10% .25W CC	01121	CB3321
A3R114	0757-0290		RESISTOR 6.19K 1% .125W F	19701	MF4C1/8-T0-6191-F
A3R115	0757-0274		RESISTOR 1.21K 1% .125W F	24546	C4-1/8-T0-1213-F
A3R116	2100-0554		RESISTOR-VAR TRMR 500 OHM 10% C TOP ADJ	73138	72PR500
A3R117	0757-0283		RESISTOR 2K 1% .125W F	24546	C4-1/8-T0-2001-F
A3R118	0757-0417		RESISTOR 562 1% .125W F TC=0+-100	24546	C4-1/8-T0-562R-F
A3R119	0757-0280		RESISTOR 1K 1% .125W F	24546	C4-1/8-T0-1001-F
A3R120	0698-3150	3	RESISTOR 2.37K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2371-F
A3R121	0757-0442		RESISTOR 10K 1% .125W F	24546	C4-1/8-T0-1002-F
A3R122	0757-0280		RESISTOR 1K 1% .125W F	24546	C4-1/8-T0-1001-F
A3R123	0757-0462		RESISTOR 75K 1% .125W F	24546	C4-1/8=T0-7502-F
A3R124	0757-0442		RESISTOR 10K 1% .125W F	24546	C4-1/8-T0-1002-F
A3R125	0698-7096	2	RESISTOR 10 10% .125W CC TC=0+-588	01121	BB1001
A3R126	0698-7229	2	RESISTOR 511 2% .05W F TC=0+-100	24546	C3-1/8-T0-511R-G
A3R127	0698-7096		RESISTOR 10 10% .125W CC TC=0+588	01121	BB1001
A3R128	0698-7229		RESISTOR 511 2% .05W F TC=0+-100	24546	C3-1/8-T0-511R-G
A3R129	0757-0433		RESISTOR 3.32K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3321-F
A3R130	0757-0442		RESISTOR 10K 1% .125W F	24546	C4-1/8-T0-1002-F
A3R131	0757-0411		RESISTOR 332 1% .125W F TC=0+-100	24546	C4-1/8-T0-332R-F
A3R132	0698-4037		RESISTOR 46.4 1% .125W F TC=0+-100	16299	C4-1/8-T0-46R4-F
A3R133	0757-0433		RESISTOR 3.32K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3321-F
A3R134	0757-1094		RESISTOR 1.47K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1471-F
A3R136	0757-0453	4	RESISTOR 30.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3012-F
A3R137	0684-0271		RESISTOR 2.7 10% .25W F CC	01121	CB27G1
A3R138	0757-0453		RESISTOR 30.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3012-F
A3R139	0757-0416	1	RESISTOR 511 1% .125W F	24546	C4-1/8-T0-511R-F
A3R140	0757-0453		RESISTOR 30.1K 1% .125W F (NOT USED IN OPTION 101)	24546	C4-1/8-T0-3012-F
A3R141	0757-0411		RESISTOR 332 1% .125W F TC=0+-100	24546	C4-1/8-T0-332R-F
A3R142	0698-7238	2	RESISTOR 1.21K 2% .05W F TC=0+-100 (USED IN OPTION 101 ONLY)	24546	C3-1/8-T0-1211-G
A3R143	0698-7238		RESISTOR 1.21K 2% .05W F TC=0+-100 (USED IN OPTION 101 ONLY)	24546	C3-1/8-T0-1211-G
A3R144	0757-0440	1	RESISTOR 7500 1% .125W F	24546	C4-1/8-T0-7501-F
A3RT1	0837-0035	2	THERMISTOR NEG TC 5K DISC	28480	0837-0035
A3RT2	0837-0035		THERMISTOR NEG TC 5K DISC	28480	0837-0035
A3S1	3101-1905	1	SWITCH-PB 4STA .394 IN-CTRS .45A 115 VAC	28480	3101-1905
A3U1	1820-1518	1	IC DM74L 00N GATE	27014	DM74L00N
A3U2	1820-0596	2	IC DM74L 74N FLIP-FLOP	27014	DM74L74N
A3U3	1820-0585	1	IC DM74L 03N GATE	27014	DM74L03N
A3U4	1820-0596		IC DM74L 74N FLIP-FLOP	27014	DM74L74N
A3VR1	1902-3082	2	DIODE-ZNR 4.64V 5% DO-7 PD=.4W TC=-.023%	04713	SZ10939-86
A3VR2	1902-3234	1	DIODE-ZNR 19.6V 5% DO-7 PD=.4W TC=+.073%	04713	SZ10939-266
A3VR3	1902-0072	1	DIODE-ZNR 7.87V 2% DO-7 PD=.4W TC=+.051%	04713	SZ10939-153
A3VR4	1902-3137	1	DIODE-ZNR 8.06V 2% DO-7 PD=.4W TC=+.052%	04713	SZ10939-156
A3VR5	1902-0441	1	DIODE-ZENER 5.11V 5% 0.4W MAX PD (NOT USED IN OPTION 101)	04713	SZ10939-98
A3W1	01740-61617	1	CABLE ASSEMBLY, COAX	28480	01740-61617
A3XU1	1200-0474	8	SOCKET; ELEC; IC 14-CONT DIP SLDR TERM	28480	1200-0474
A3XU2	1200-0474		SOCKET; ELEC; 14-CONT DIP SLDR TERM	28480	1200-0474
A3XU3	1200-0474		SOCKET; ELEC, IC 14-CONT DIP SLDR TERM	28480	1200-0474

See introduction to this section for ordering information

Table 6-2. Replaceable Parts (Cont'd)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A3XU4	1200-0474		SOCKET; ELEC; IC 14-CONT DIP SLDR TERM	28480	1200-0474
A4	01740-61611	1	CABLE ASSEMBLY, DELAY LINE	28480	01740-61611
A5	01740-66505	1	BOARD ASSEMBLY, VERTICAL OUTPUT (DOES NOT INCLUDE A5A1)	28480	01740-66505
A5A1	5081-3032	1	ASSY, SUBSTRATE (NOT SUPPLIED W/A5, ORDER SEPARATELY)	28480	5081-3032
A5C1	0150-0029	1	CAPACITOR-FXD 1PF +-10% 500WVDC TI DIOX	95121	TYPE QC
A5C2	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A5C3	0160-3652	1	CAPACITOR-FXD 4.7PF +.5-4.7PF 200WVDC (FACTORY SELECTED VALUE)	28480	0160-3652
A5C4	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A5C5	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A5C6	0180-2255		C:FXD TA ELECT 22UF 20% 20VDCW	72982	301-000-C0H0-829C
A5C7	0180-2255		C:FXD TA ELECT 22UF 20% 20VDCW	72982	301-000-C0H0-829C
A5C8	0160-3650	1	CAPACITOR-FXD .018UF +-10% 50WVDC CER	28480	0160-3650
A5C9	0160-3799		CAPACITOR-FXD 18PF +-10% 100WVDC CER	28480	0160-3799
A5C10	0160-3569	2	CAPACITOR-FXD 27PF +-5% 100WVDC CER	28480	0160-3569
A5C11	0160-3651	1	CAPACITOR-FXD 68PF +-10% 200WVDC CER	28480	0160-3651
A5C12	0160-3694	1	CAPACITOR-FXD 330PF +-10% 100WVDC CER	28480	0160-3694
A5C13	0180-0230	4	CAPACITOR-FXD; 1UF +-20% 50VDC TA-SOLID	56289	150D105X0050A2
A5C14	0160-3799		CAPACITOR-FXD; 18PF +-10% 100WVDC CER	28480	0160-3799
A5C15	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A5C16	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A5C17	0160-3848	1	CAPACITOR-FXD 3.3PF +-.5PF 100WVDC CER	28480	0160-3348
A5L1	9100-2598	2	COIL-FXD MOLDED RF CHOKE .075UH 10%	06560	10150-14
A5L2	9100-2258	3	COIL-FXD MOLDED RF CHOKE 1.2UH 10%	24226	10/121
A5L3	9100-2258		COIL-FXD MOLDED RF CHOKE 1.2UH 10%	24226	10/121
A5L4	9100-2598		COIL-FXD MOLDED RF CHOKE .075UH 10%	06560	10150-14
A5L5	9100-2250	2	COIL-FXD MOLDED RF CHOKE .18UH 10%	24226	10/180
A5L6	9100-2250		COIL-FXD MOLDED RF CHOKE .18UH 10%	24226	10/180
A5L7	9100-2252	2	COIL-FXD MOLDED RF CHOKE .27UH 10%	24226	10/270
A5L8	9100-2252		COIL-FXD MOLDED RF CHOKE .27UH 10%	24226	10/270
A5L9	9100-2258		COIL-FXD MOLDED RF CHOKE 1.2UH 10%	24226	10/121
A5MP1	01740-20506	1	HEAT SINK, V OUTPUT	28480	01740-20506
A5Q1	1853-0354	8	TRANSISTOR PNP SI T0-92 PD=350MW	28480	1853-0354
A5Q2	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A5Q3	1853-0354		TRANSISTOR PNP SI T0-92 PD=350MW	28480	1853-0354
A5Q4	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A5R1	0698-4399	2	RESISTOR 88.7 1% .125W F TC=0+-100	16299	C4-1/8-T0-88R7-F
A5R2	0757-0734	2	RESISTOR 1.21K 1% .25W F TC=0+-100	24546	C5-1/4-T0-1211-F
A5R3	0757-0719	1	RESISTOR 221 1% .25W F TC=0+-100	24546	C5-1/4-T0-221R-F
A5R4	0757-0734		RESISTOR 1.21K 1% .25W F TC=0+-100	24546	C5-1/4-T0-1211-F
A5R5	0698-4399		RESISTOR 88.7 1% .125W F TC=0+-100	16299	C4-1/8-T0-88R7-F
A5R6	0698-7028	1	RESISTOR 27 10% .125W CC TC=0+588	01121	BB2701
A5R7	0684-1011	13	RESISTOR 100 10% .25W CC	01121	CB1011
A5R8	0757-0200	3	RESISTOR 5.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5621-F
A5R9	0698-0083	2	RESISTOR 1.96K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1961-F
A5R10	0684-1001		RESISTOR 10 10% .25W CC	01121	CB1001
A5R11	0757-0200		RESISTOR 5.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5621-F
A5R12	0684-1001		RESISTOR 10 10% .25W CC	01121	CB1001
A5R13	0698-0083		RESISTOR 1.96K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1961-F
A5R14	0757-0399	3	RESISTOR 82.5 1% .125W F TC=0+-100	24546	C4-1/8-T0-82R5-F
A5R15	0698-7386	2	RESISTOR 490.9 .5% .125W F TC=0+-50	19701	MF4C1/8-T2-490R9-D
A5R16	0698-7386		RESISTOR 490.9 .5% .125W F TC=0+-50	19701	MF4C1/8-T2-490R9-D
A5R17	0757-0399		RESISTOR 82.5 1% .125W F TC=0+-100	24546	C4-1/8-T0-82R5-F
A5R18	0757-0288	2	RESISTOR 9.09K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-9091-F
A5R19	2100-2216	2	RESISTOR-TRMR 5K 10% C TOP-ADJ 1-TURN	30983	ET50W502
A5R20	2100-1788	3	RESISTOR-TRMR 500 10% C TOP-ADJ 1-TURN	30983	ET50W501
A5R21	0757-0401	1	RESISTOR 100 1% .125W F TC=0+-100 (FACTORY SELECTED VALUE)	24546	C4-1/8-T0-101-F
A5R22	2100-2216		RESISTOR-TRMR 5K 10% C TOP-ADJ 1-TURN	30983	ET50W502
A5R23	0698-7252	1	RESISTOR 4.64K 2% .05W F TC=0+-100	24546	C3-1/8-T0-4641-G
A5R24	2100-1986		RESISTOR-TRMR 1K 10% C	28480	2100-1986
A5R25	0757-0416	1	RESISTOR 511 1% .125W F	24546	C4-1/8-T0-511R-F
A5R26	0757-0720	1	RESISTOR 243 1% .25W F TC=0+-100	24546	C5-1/4-T0-243R-F
A5VR1	1902-3082		DIODE-ZNR 4.64V 5% D0-7 PD=.4W TC= -.023%	04713	SZ10939-86
A5XA3	1251-3903	1	CONNECTOR 6-PIN F POST TYPE	27264	09-52-3061
A6	0960-0429	1	ASSY, HV MULTIPLIER (NON-REPAIRABLE)	28480	0960-0429
A7	01740-66524	1	BOARD ASSY, HORIZONTAL SWEEP	28480	01740-66524
A7 OPTION 101	01740-66525	1	BOARD ASSY, HORIZONTAL SWEEP (USES SAME PARTS AS 01740-66524 EXCEPT WHERE NOTED)	28480	01740-66525
A7C1	0160-3569		CAPACITOR-FXD 27PF +-5% 100WVDC CER	28480	0160-3569
A7C2	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A7C3	0140-0202	1	CAPACITOR-FXD 15PF +-5% 500WVDC MICA	72136	DM15C150J0500WV1CR
A7C4	0150-0070	2	CAPACITOR-FXD .02UF +-20% 500WVDC CER	28480	0150-0070
A7C5	0140-0196	2	CAPACITOR-FXD 150PF +-5% 300WVDC MICA	72136	DM15F151J0300WV1CR
A7C6	0160-3318	1	CAPACITOR-FXD .047UF +-10% 100WVDC CER	28480	0160-3318
A7C7	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A7C8	0150-0021		CAPACITOR-FXD .47PF +-5% 500WVDC TI DIOX	95121	TYPE QC
A7C9	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451

See introduction to this section for ordering information

Table 6-2. Replaceable Parts (Cont'd)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A7C10	0140-0193	2	CAPACITOR-FXD 82PF +-5% 300WVDC MICA	72136	DM15E820J0300WV1CR
A7C11	0160-3443		CAPACITOR-FXD .1UF +80-20% 50WVDC CER	28480	0160-3443
A7C12	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A7C13	0160-4442		CAPACITOR-FXD .15UF +80-20%	28480	0160-4442
A7C14	0160-2204	4	CAPACITOR-FXD 100PF +-5% 300WVDC MICA	28480	0160-2204
A7C15	0180-0374	1	CAPACITOR-FXD 10UF +-10% 20VDC TA SOLID	56289	150D106X9020B2
A7C16	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A7C17	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A7C18	0180-0058	2	CAPACITOR-FXD 50UF +75-10% 25VDC AL	56289	30D506G025CC2
A7C19	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A7C20	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A7C21	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A7C22	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A7C23	0180-1746	2	CAPACITOR-FXD 15UF +-10% 20VDC TA-SOLID	56289	150D156X9020B2
A7C24	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A7C25	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A7C26	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A7C27	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A7C28	0180-0106	1	CAPACITOR-FXD 60UF +-20% 6VDC TA-SOLID	56289	150D606X0006B2
A7C29	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A7C30	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A7C31	0180-0229	1	CAPACITOR-FXD 33UF +-10% 10VDC TA-SOLID	56289	150D336X9010B2
A7C32	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A7C33	0180-1746		CAPACITOR-FXD 15UF +-10% 20VDC TA-SOLID	56289	150D156X9020B2
A7C34	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A7C35	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A7C36	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A7C37	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A7C38	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A7C39	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A7C40	0160-2198		CAPACITOR-FXD 20PF +-5% 300WVDC MICA	28480	0160-2198
A7C41	0160-2198		CAPACITOR-FXD 20PF +-5% 300WVDC MICA	28480	0160-2198
A7C42	0160-2197	1	CAPACITOR-FXD 10PF +-5% 300WVDC MICA	28480	0160-2197
A7C43			NOT ASSIGNED		
A7C44	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A7C45	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A7C46	0140-0204	1	CAPACITOR-FXD 47PF +-5% 500WVDC MICA	72136	DM15E470J0500WV1CR
A7C47	0160-2204		CAPACITOR-FXD 100PF +-5% 300WVDC MICA	28480	0160-2204
A7C48	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A7C49	0140-0193		CAPACITOR-FXD 82PF +-5% 300WVDC MICA	72136	DM15E820J0300WV1CR
A7CR1	1901-0376	1	DIODE-GEN PRP 35V 50NA D0-7	28480	1901-0376
A7CR2	1901-0040		DIODE-SWITCHING 30V 50MA 2NS D0-35	28480	1901-0040
A7CR3	1901-0040		DIODE-SWITCHING 30V 50MA 2NS D0-35	28480	1901-0040
A7CR4	1901-0040		DIODE-SWITCHING 30V 50MA 2NS D0-35	28480	1901-0040
A7CR5	1901-0513	1	DIODE-MULT	28480	1901-0513
A7CR6	1901-0040		DIODE-SWITCHING 30V 50MA 2NS D0-35	28480	1901-0040
A7CR7	1901-0040		DIODE-SWITCHING 30V 50MA 2NS D0-35	28480	1901-0040
A7CR8	1901-0040		DIODE-SWITCHING 30V 50MA 2NS D0-35	28480	1901-0040
A7CR9	1901-0040		DIODE-SWITCHING 30V 50MA 2NS D0-35	28480	1901-0040
A7CR10	1901-0040		DIODE-SWITCHING 30V 50MA 2NS D0-35	28480	1901-0040
A7CR11	1901-0040		DIODE-SWITCHING 30V 50MA 2NS D0-35	28480	1901-0040
A7CR12	1901-0040		DIODE-SWITCHING 30V 50MA 2NS D0-35	28480	1901-0040
A7CR13	1901-0040		DIODE-SWITCHING 30V 50MA 2NS D0-35	28480	1901-0040
A7CR14			NOT ASSIGNED		
A7CR15	1910-0016	2	DIODE-GE 60V 60NA 1US D0-7	28480	1910-0016
A7CR16	1901-0040		DIODE-SWITCHING 30V 50MA 2NS D0-35	28480	1901-0040
A7CR17	1901-0047		DIODE-SWITCHING 20V 75NA 10NS	28480	1901-0047
			CR17-20 (USED IN OPTION 101 ONLY)		
A7CR18	1901-0047		DIODE-SWITCHING 20V 75NA 10NS	28480	1901-0047
A7CR19	1901-0047		DIODE-SWITCHING 20V 75NA 10NS	28480	1901-0047
A7CR20	1901-0047		DIODE-SWITCHING 20V 75NA 10NS	28480	1901-0047
A7CR21	1901-0040		DIODE-SWITCHING 2NS 30V 50MA	28480	1901-0040
A7CR22	1901-0040		DIODE-SWITCHING 2NS 30V 50MA	28480	1901-0040
A7CR23	1901-0040		DIODE-SWITCHING 2NS 30V 50MA	28480	1901-0040
A7CR24	1910-0016	1	DIODE GE 60V 60NA 10S D0-7	28480	1910-0016
A7L1	9140-0105	7	COIL-FXD MOLDED RF CHOKE 8.2UH 10%	24226	15/821
A7L2	9140-0096	3	COIL-FXD MOLDED RF CHOKE 1UH 10%	24226	15/101
A7L3	9100-1613		COIL-FXD MOLDED RF CHOKE .47UH 20%	24226	15/470
A7L4	9140-0096		COIL-FXD MOLDED RF CHOKE 1UH 10%	24226	15/101
A7L5	9140-0105		COIL-FXD MOLDED RF CHOKE 8.2UH 10%	24226	15/821
A7L6	9140-0096		COIL-FXD MOLDED RF CHOKE 1UH 10%	24226	15/101
A7L7	9100-1613		COIL-FXD MOLDED RF CHOKE .47UH 20%	24226	15/470
A7L8	9170-0029	4	CORE-SHIELDING BEAD	02114	56-590-65A2/4A
A7L9	9170-0029		CORE-SHIELDING BEAD	02114	56-590-65A2/4A
A7L10	9170-0029		CORE-SHIELDING BEAD	02114	56-590-65A2/4A
A7P1			NSR		
A7P2	1251-3901	2	CONNECTOR 15-PIN M POST TYPE	27264	09-65-1151
A7P3	1251-3750		CONNECTOR 10-PIN M POST TYPE	27264	09-65-1101
A7P4	1251-4238		CONNECTOR 9-PIN M POST TYPE	28480	1251-4238
A7P5	1251-3071		CONNECTOR 8-PIN M POST TYPE	27264	09-56-1081(2183-8A)
A7Q1	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A7Q2	1854-0092		TRANSISTOR NPN SI PD=200MW FT=600MHZ	28480	1854-0092

Table 6-2. Replaceable Parts (Cont'd)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A7Q3	1854-0092		TRANSISTOR NPN SI PD=200MW FT=600MHZ	28480	1854-0092
A7Q4	1855-0081	3	TRANSISTOR J-FET 2N5245 N-CHAN D-MODE SI	01295	2N5245
A7Q5	1854-0092		TRANSISTOR NPN SI PD=200MW FT=600MHZ	28480	1854-0092
A7Q6	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A7Q7	1853-0380		TRANSISTOR PNP SI T0-92 PD=350MW	28480	1853-0380
A7Q8	1853-0380		TRANSISTOR PNP SI T0-92 PD=350MW	28480	1853-0380
A7Q9	1853-0354		TRANSISTOR PNP SI T0-92 PD=350MW	28480	1853-0354
A7Q10	1853-0354		TRANSISTOR PNP SI T0-92 PD=350MW	28480	1853-0354
A7Q11	1853-0354		TRANSISTOR PNP SI T0-92 PD=350MW	28480	1853-0354
A7Q12	1853-0380		TRANSISTOR PNP SI T0-92 PD=350MW	28480	1853-0380
A7Q13	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A7Q14	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A7Q15	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A7Q16	1854-0691	3	TRANSISTOR NPN SI T0-92 PD=350MW	28480	1854-0691
A7Q17	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A7Q18	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A7Q19	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A7Q20	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A7Q21	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A7Q22	1853-0015		TRANSISTOR PNP SI PD=200MW FT=500MHZ	28480	1853-0015
A7Q23	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A7Q24	1854-0092		TRANSISTOR NPN SI PD=200MW FT=600MHZ	28480	1854-0092
A7Q25	1854-0092		TRANSISTOR NPN SI PD=200MW FT=600MHZ	28480	1854-0092
A7Q26	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A7Q27	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A7Q28	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A7Q29	1854-0092		TRANSISTOR NPN SI PD=200MW FT=600MHZ	28480	1854-0092
A7Q30	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A7Q31	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A7Q32	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A7Q33	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A7Q34	1854-0092		TRANSISTOR NPN SI PD=200MW FT=600MHZ	28480	1854-0092
A7R1	0698-3263	3	RESISTOR 500K 1% .125W F TC=0+-100	91637	MFF-1/8-T-1
A7R2	0698-3263		RESISTOR 500K 1% .125W F TC=0+-100	91637	MFF-1/8-T-1
A7R3	0757-0476	1	RESISTOR 301K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3013-F
A7R4	0757-0486	2	RESISTOR 750K 1% .125W F TC=0+-100	24546	NA4
A7R5	0757-0421	2	RESISTOR 825 1% .125W F	24546	C4-1/8-T0-825R-F
A7R6	0757-0283		RESISTOR 2K 1% .125W F	24546	C4-1/8-T0-2001-F
A7R7	0757-0418		RESISTOR 619 1% .125W F	24546	C4-1/8-T0-619R-F
A7R8	0684-4721	3	RESISTOR 4.7K 10% .25W CC	01121	CB4721
A7R9	0684-2711	2	RESISTOR 270 10% .25W FC TC=-400/+600	01121	CB2711
A7R10	0684-1061	1	RESISTOR 10M 10% .25W CC	01121	CB1061
A7R11	0698-3263		RESISTOR 500K 1% .125W F TC=0+-100	91637	MFF-1/8-T-1
A7R12	0683-1505	3	RESISTOR 15 5% .25W FC TC=-400/+500	01121	CB1505
A7R13	0757-0486		RESISTOR 750K 1% .125W F TC=0+-100	24546	NA4
A7R14	0684-6811	5	RESISTOR 680 10% .25W FC TC=-400/+600	01121	CB6811
A7R15	0684-6811		RESISTOR 680 10% .25W FC TC=-400/+600	01121	CB6811
A7R16	0684-4721		RESISTOR 4.7K 10% .25W CC	01121	CB4721
A7R17	0684-4721		RESISTOR 4.7K 10% .25W CC	01121	CB4721
A7R18	0684-1011		RESISTOR 100 10% .25W CC	01121	CB1011
A7R19	0684-2711		RESISTOR 270 10% .25W FC TC=-400/+600	01121	CB2711
A7R20	2100-3351	3	RESISTOR-VAR TRMR 500 OHM 10% C SIDE ADJ	73138	72XR500
A7R21	2100-3434	2	RESISTOR-VAR CONTROL CC 50K 10% LIN	01121	70M4N048P503U
A7R22	0757-0433		RESISTOR 3.32K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3321-F
A7R23	0698-3446	6	RESISTOR 383 1% .125W F TC=0+-100	16299	C4-1/8-T0-383R-F
A7R24	0684-4721		RESISTOR 4.7K 10% .25W CC	01121	CB4721
A7R25	0684-1011		RESISTOR 100 10% .25W CC	01121	CB1011
A7R26	0698-3433	5	RESISTOR 28.7 1% .125W F TC=0+-100	03888	PME55-1/8-T0-28R7-F
A7R27	0698-3433		RESISTOR 28.7 1% .125W F TC=0+-100	03888	PME55-1/8-T0-28R7-F
A7R28	0757-0427	4	RESISTOR 1.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1501-F
A7R29	0757-0281	1	RESISTOR 2.74K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2741-F
A7R30	0757-0466	2	RESISTOR 110K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1103-F
A7R31	0757-0488	4	RESISTOR 909K 1% .125W F TC=0+-100	24546	NA4
A7R32	0684-4701	3	RESISTOR 47 10% .25W CC	01121	CB4701
A7R33	0684-2701	2	RESISTOR 27 10% .25W FC TC=-400/+500	01121	CB2701
A7R34	0757-0433		RESISTOR 3.32K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3321-F
A7R35	0757-0433		RESISTOR 3.32K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3321-F
A7R36	0757-0410	2	RESISTOR 301 1% .125W F	24546	C4-1/8-T0-301R-F
A7R37	0757-0746	1	RESISTOR 4.75K 1% .25W F TC=0+-100	24546	C5-1/4-T0-4751-F
A7R38	0757-0416	9	RESISTOR 511 1% .125W F	24546	C4-1/8-T0-511R-F
A7R39	0757-0416		RESISTOR 511 1% .125W F	24546	C4-1/8-T0-511R-F
A7R40	0757-0440	1	RESISTOR 7.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-7501-F
A7R41	2100-3351		RESISTOR-VAR TRMR 500 OHM 10% C SIDE ADJ	73138	72XR500
A7R42	0757-0280		RESISTOR 1K 1% .125W F	24546	C4-1/8-T0-1001-F
A7R43	0684-1511	3	RESISTOR 150 10% .25W FC TC=-400/+600	01121	CB1511
A7R44	0684-1001		RESISTOR 10 10% .25 CC	01121	CB1001
A7R45	0757-0281		RESISTOR 2.74K 1% .125W F	24546	C4-1/8-T0-2741-F
A7R46	0757-0401		RESISTOR 100 1% .125W F	24546	C4-1/8-T0-101-F
A7R47	0684-4701		RESISTOR 47 10% .25W CC	01121	CB4701
A7R48	0684-1521		RESISTOR 1.5K 10% .25W CC	01121	CB1521

See introduction to this section for ordering information

Table 6-2. Replaceable Parts (Cont'd)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A7R49	0757-0399		RESISTOR 82.5 1% .125W F TC=0+-100	24546	C4-1/8-T0-82R5-F
A7R50	0757-0284		RESISTOR 150 1% .125W F	24546	C4-1/8-T0-151-F
A7R51	0757-0284		RESISTOR 150 1% .125W F	24546	C4-1/8-T0-151-F
A7R52	0684-0271		RESISTOR 2.7 10% .25W CC	01121	CB27G1
A7R53	0757-0408		RESISTOR 243 1% .125W F	24546	C4-1/8-T0-243R-F
A7R54	0757-0435		RESISTOR 3.92K 1% .125W F	24546	C4-1/8-T0-3921-F
A7R55	0757-0416		RESISTOR 511 1% .125W F	24546	C4-1/8-T0-511R-F
A7R56	0757-0442		RESISTOR 10K 1% .125W F	24546	C4-1/8-T0-1002-F
A7R57	0698-3446		RESISTOR 383 1% .125W F TC=0+-100	16299	C4-1/8-T0-383R-F
A7R58	0757-0421		RESISTOR 825 1% .125W F	24546	C4-1/8-T0-825R-F
A7R59	0684-4711		RESISTOR 470 10% .25W CC	01121	CB4711
A7R60	0757-0412	2	RESISTOR 365 1% .125W F TC=0+-100	24546	C4-1/8-T0-365R-F
A7R61	0757-0422	2	RESISTOR 909 1% .125W F TC=0+-100	24546	C4-1/8-T0-909R-F
A7R62	0757-0406	1	RESISTOR 182 1% .125W F TC=0+-100	24546	C4-1/8-T0-182R-F
A7R63	0757-0434	6	RESISTOR 3.65K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3651-F
A7R64	0757-0447	1	RESISTOR 16.2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1622-F
A7R65	0698-7926		RESISTOR 470 10% .125W CC	01121	BB4711
A7R66	0698-7926		RESISTOR 470 10% .125W CC	01121	BB4711
A7R67	0757-0427		RESISTOR 1.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1501-F
A7R68	0698-7926		RESISTOR 470 10% .125W CC	01121	BB4711
A7R69	0757-0415	2	RESISTOR 475 1% .125W F TC=0+-100	24546	C4-1/8-T0-475R-F
A7R70	0757-0407		RESISTOR 200 1% .125W F	24546	C4-1/8-T0-201-F
A7R71	0757-0439	7	RESISTOR 6.81K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6811-F
A7R72	0684-1221		RESISTOR 1.2K 10% .25W CC	01121	CB1221
A7R73	0684-2221		RESISTOR 2.2K 10% .25W CC	01121	CB2221
A7R74	0684-6821		RESISTOR 6.8K 10% .25W CC	01121	CB6821
A7R75	0757-0415		RESISTOR 475 1% .125W F TC=0+-100	24546	C4-1/8-T0-475R-F
A7R76	0757-0124	2	RESISTOR 39.2K 1% .125W F TC=0+-100	24546	C5-1/4-T0-3922-F
A7R77	0757-0448	1	RESISTOR 18.2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1822-F
A7R78	0757-0437		RESISTOR 4.75K 1% .125W F	24546	C4-1/8-T0-4751
A7R79	0757-0401		RESISTOR 100 1% .125W F	24546	C4-1/8-T0-101-F
A7R80	0757-0401		RESISTOR 100 1% .125W F	24546	C4-1/8-T0-101-F
A7R81	0757-0409	1	RESISTOR 274 1% .125W F TC=0+-100	24546	C4-1/8-T0-274R-F
A7R82	0757-0401		RESISTOR 100 1% .125W F	24546	C4-1/8-T0-101-F
A7R83	0757-0407		RESISTOR 200 1% .125W F	24546	C4-1/8-T0-201-F
A7R84	0757-0407		RESISTOR 200 1% .125W F	24546	C4-1/8-T0-201-F
A7R85	0757-0435		RESISTOR 3.92K 1% .125W F	24546	C4-1/8-T0-3921-F
A7R86	0757-0439		RESISTOR 6.81K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6811-F
A7R87	0757-0280		RESISTOR 1K 1% .125W F	24546	C4-1/8-T0-1001-F
A7R88	0757-0290		RESISTOR 6.19K 1% .125W F	19701	MF4C1/8-T0-6191-F
A7R89	0757-0412		RESISTOR 365 1% .125W F TC=0+-100	24546	C4-1/8-T0-365R-F
A7R90	0698-0085	2	RESISTOR 2.61K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2611-F
A7R91	0757-0407		RESISTOR 200 1% .125W F	24546	C4-1/8-T0-201-F
A7R92	0698-3433		RESISTOR 28.7 1% .125W F TC=0+-100	03888	PME55-1/8-T0-28R7-F
A7R93	2100-3211	1	RESISTOR-VAR TRMR 1K OHM 10% C TOP ADJ	73138	72PR1K
A7R94	0757-0438	4	RESISTOR 5.11K 1% .125W F	24546	C4-1/8-T0-511-F
A7R95	0757-0444	2	RESISTOR 12.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1212-F
A7R96	0757-0430	2	RESISTOR 2.21K 1% .125W F	24546	C4-1/8-T0-2211-F
A7R97	2100-3350		RESISTOR-VAR TRMR 200 10% C SIDE ADJ	73138	72XR201
A7R98	0757-0410		RESISTOR 301 1% .125W F	24546	C4-1/8-T0-301R-F
A7R99	0757-0283		RESISTOR 2K 1% .125W F	24546	C4-1/8-T0-2001-F
A7R100	0757-0404	1	RESISTOR 130 1% .125W F TC=0+-100	24546	C4-1/8-T0-131-F
A7R101	0757-0418		RESISTOR 619 1% .125W F	24546	C4-1/8-T0-619R-F
A7R102	0698-3446		RESISTOR 383 1% .125W F TC=0+-100	16299	C4-1/8-T0-383R-F
A7R103	0698-3155	2	RESISTOR 4.64K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4641-F
A7R104	0684-3311	3	RESISTOR 330 10% .25W CC	01121	CB3311
A7R105	2100-3253	3	RESISTOR-VAR TRMR 50K OHM 10% C TOP ADJ	73138	72PR50K
A7R106	0757-0416		RESISTOR 511 1% .125W F	24546	C4-1/8-T0-511R-F
A7R107	0757-0457	3	RESISTOR 47.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4752-F
A7R108	0757-0437		RESISTOR 4.75K 1% .125W F	24546	C4-1/8-T0-4751-F
A7R109	0684-1021	5	RESISTOR 1K 10% .25W CC	01121	CB1021
A7R110	0684-2221		RESISTOR 2.2K 10% .25W CC	01121	CB2221
A7R111	0757-0474	1	RESISTOR 243K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2433-F
A7R112	0757-0444		RESISTOR 12.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1212-F
A7R113	0698-3158	2	RESISTOR 23.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2372-F
A7R114	0757-0280		RESISTOR 1K 1% .125W F	24546	C4-1/8-T0-1001-F
A7R115	0757-0401		RESISTOR 100 1% .125W F	24546	C4-1/8-T0-101-F
A7R116			NOT ASSIGNED		
A7R117	2100-0568		RESISTOR-VAR TRMR 100 OHM 10% C TOP ADJ	73138	72PR100
A7R118	0684-1001		RESISTOR 10 10% .25W CC	01121	CB1001
A7R119	0684-1001		RESISTOR 10 10% .25W CC	01121	CB1001
A7R120	0684-1001		RESISTOR 10 10% .25W CC	01121	CB1001
A7R121	0684-1001		RESISTOR 10 10% .25W CC	01121	CB1001
A7R122	0684-1001		RESISTOR 10 10% .25W CC	01121	CB1001
A7R123	0684-1001		RESISTOR 10 10% .25W CC	01121	CB1001
A7R124	0684-1001		RESISTOR 10 10% .25W CC	01121	CB1001
A7R125	0684-1021		RESISTOR 1K 10% .25W CC	01121	CB1021
A7R126	0684-4711		RESISTOR 470 10% .25W CC	01121	CB4711
A7R127	0684-4721		RESISTOR 4.7K 10% .25W CC	01121	CB4721
A7R128	0684-1021		RESISTOR 1K 10% .25W CC	01121	CB1021

Table 6-2. Replaceable Parts (Cont'd)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A7R129	0698-3446		RESISTOR 383 1% .125W F TC=0+–100	16299	C4-1/8-T0-383R-F
A7R130	0757-0435		RESISTOR 3.92K 1% .125W F	24546	C4-1/8-T0-3921-F
A7R131	0698-3446		RESISTOR 383 1% .125W F TC=0+–100	16299	C4-1/8-T0-383R-F
A7R132	0698-3446		RESISTOR 383 1% .125W F TC=0+–100	16299	C4-1/8-T0-383R-F
A7R133	0757-0434		RESISTOR 3.65K 1% .125W F TC=0+–100	24546	C4-1/8-T0-3651-F
A7R134	0757-0289	1	RESISTOR 13.3K 1% .125W F TC=0+–100	19701	MF4C1/8-T0-1332-F
A7R135	0757-0427		RESISTOR 1.5K 1% .125W F TC=0+–100	24546	C4-1/8-T0-1501-F
A7R136	0757-0408	4	RESISTOR 243 1% .125W F TC=0+–100	24546	C4-1/8-T0-243R-F
A7R137	0757-0280		RESISTOR 1K 1% .125W F	24546	C4-1/8-T0-1001-F
A7R138	0684-4721		RESISTOR 4.7K 10% .25W CC	01121	CB4721
A7R139	0684-1021		RESISTOR 1K 10% .25W CC	01121	CB1021
A7R140	0757-0438		RESISTOR 5.11K 1% .125W F	24546	C4-1/8-T0-5111-F
A7R141	0757-0290		RESISTOR 6.19K 1% .125W F	19701	MF4C1/8-T0-6191-F
A7R142	0684-4721		RESISTOR 4.7K 10% .25W CC	01121	CB4721
A7R143	0684-4721		RESISTOR 4.7K 10% .25W CC	01121	CB4721
A7R144	0684-4711		RESISTOR 470 10% .25W CC	01121	CB4711
A7R145	0757-0416		RESISTOR 511 1% .125W F	24546	C4-1/8-T0-511R-F
A7R146	5081-7476		RESISTOR 0757-0416 PF .40	28480	5081-7476
A7R147	0757-0439		RESISTOR 6.81K 1% .125W F TC=0+–100	24546	C4-1/8-T0-6811-F
A7R148	0757-0419	1	RESISTOR 681 1% .125W F TC=0+–100	24546	C4-1/8-T0-681R-F
A7R149	0684-1021		RESISTOR 1K 10% .25W CC	01121	CB1021
A7R150	0757-0391	1	RESISTOR 39.2 1% .125W F TC=0+–100	24546	C4-1/8-T0-39R2-F
A7R151	0684-1011		RESISTOR 100 10% .25W CC	01121	CB1011
A7R152	0757-0466		RESISTOR 110K 1% .125W F TC=0+–100	24546	C4-1/8-T0-1103-F
A7R153	0684-4701		RESISTOR 47 10% .25W CC	01121	CB4701
A7R154	0684-4711		RESISTOR 470 10% .25W CC	01121	CB4711
A7R155	0757-0283		RESISTOR 2K 1% .125W F	24546	C4-1/8-T0-2001-F
A7R156	0684-2701		RESISTOR 27 10% .25W FC TC=–400/+500	01121	CB2701
A7R157	0684-1811		RESISTOR 180 10% .25W CC	01121	CB1811
A7R158	0684-1001		RESISTOR 10 10% .25W CC	01121	CB1001
A7R159	0757-0442		RESISTOR 10K 1% .125W F	24546	C4-1/8-T0-1002-F
A7R160	0757-0428	3	RESISTOR 1.62K 1% .125W F TC=0+–100	24546	C4-1/8-T0-1621-F
A7R161	0684-1511		RESISTOR 150 10% .25W FC TC=–400/+600	01121	CB1511
A7R162	0757-0416		RESISTOR 511 1% .125W F	24546	C4-1/8-T0-511R-F
A7R163	0684-1511		RESISTOR 150 10% .25W FC TC=–400/+600	01121	CB1511
A7R164	0684-3311		RESISTOR 330 10% .25W CC	01121	CB3311
A7R165	0757-0465		RESISTOR 100K 1% .125W F	24546	C4-1/8-T0-1003-F
A7R166	0757-0433		RESISTOR 3.32K 1% .125W F	24546	C4-1/8-T0-3321-F
A7R167	0757-0465		RESISTOR 100K 1% .125W F	24546	C4-1/8-T0-1003-F
A7R168	0757-0433		RESISTOR 3.32K 1% .125W F	24546	C4-1/8-T0-3321-F
A7R169	2100-0567		RESISTOR-VAR TRMR 2K 10% C	73138	72PR2K
A7S1	3101-1906	1	SWITCH-PB 4STA DPDT .394 IN-CTRS .45A	28480	3101-1906
A7S2	3101-1909	1	SWITCH-PB 6STA DPDT P-P .394 IN-CTRS	28480	3101-1909
A7S3	3101-1907	2	SWITCH-PB 4STA INTLH .394 IN-CTRS .45A	28480	3101-1907
A7U1	1826-0045	3	IC AMPL	28480	1826-0045
A7U2	5081-3019	2	INTEGRATED CIRCUIT, SEALED PACKAGE	28480	5081-3019
A7U3	1826-0045		IC AMPL	28480	1826-0045
A7U4	1821-0001	2	IC CA3046 XSTR ARRAY	02735	CA3046
A7W1	01740-61605	1	CABLE ASSEMBLY, GATE DRIVER	28480	01740-61605
A7XA9	1251-0588	1	CONNECTOR 12-PIN F POST TYPE	27264	09-52-3121
A7XU1	1200-0763	4	SOCKET-IC 8-CONT DIP-SLDR-TERMS	0080A	A8SG
A7XU2	1200-0438	1	SOCKET-IC 16-CONT DIP-SLDR-TERMS	00779	583529-1
A7XU3	1200-0763		SOCKET-IC 8-CONT DIP-SLDR-TERMS	0080A	A8SG
A7XU4	1200-0441	2	SOCKET-IC 14-CONT DIP-SLDR-TERMS	00779	583527-1
A8	01740-66523	1	BOARD ASSY, MAIN SWEEP	28480	01740-66523
A8C1	0160-3451		CAPACITOR-FXD .01UF +80–20% 100WVDC CER	28480	0160-3451
A8C2	0160-3451		CAPACITOR-FXD .01UF +80–20% 100WVDC CER	28480	0160-3451
A8C3	0180-0197	9	CAPACITOR-FXD 2.2UF +–10% 20VDC TA	56289	150D225X9020A2
A8C4	0160-3451		CAPACITOR-FXD .01UF +80–20% 100WVDC CER	28480	0160-3451
A8C5	0140-0218	2	CAPACITOR-FXD 160PF +–2% 300WVDC MICA	72136	DM15F161G0300WV1CR
A8C6	0160-2204	1	CAPACITOR-FXD 100 PF 5% 300WVDC MICA	28480	0160-2204
A8C7			NOT ASSIGNED		
A8C8	0160-3451		CAPACITOR-FXD .01UF +80–20% 100WVDC CER	28480	0160-3451
A8C9	0160-3226	2	CAPACITOR-FXD .01UF +–10% 400WVDC MET	28480	0160-3226
A8C10	0160-3726	2	CAPACITOR-FXD 1UF +–10% 40WVDC MET POLYC	28480	0160-3726
A8C11	0180-0481	1	CAPACITOR-FXD 100UF +–10% 20VDC TA-WET	28480	0180-0481
A8C12	0140-0190	1	CAPACITOR-FXD 39PF +–5% 300WVDC MICA	72136	DM15E390J0300WV1CR
A8C13	0140-0207	1	CAPACITOR-FXD 330 PF +–5% 500WVDC MICA	72136	DM15F331J0500WV1CR
A8C14	0160-0155	1	CAPACITOR-FXD 3300 PF +–10% 200WVDC POLYE	56289	292P33292
A8C15	0160-0194	1	CAPACITOR-FXD .015UF +–10% 200WVDC POLYE	56289	292P15392
A8C16	0180-2079	1	CAPACITOR-FXD .39UF +–10% 35VDC TA	56289	150D394X9035A2
A8C17	0180-1745	1	CAPACITOR-FXD 1.5UF +–10% 20VDC TA	56289	150D155X9020A2
A8C18	0180-2111		CAPACITOR-FXD 33UF +–10% 35 VDC TA-SOLID	56289	150D336X9035SA
A8C19	0180-0197		CAPACITOR-FXD 2.2UF +–10% 20VDC TA	56289	150D225X9020A2
A8C20	0160-3451		CAPACITOR-FXD .01UF +80–20% 100WVDC CER	28480	0160-3451
A8C21	0180-0197		CAPACITOR-FXD 2.2UF +–10% 20VDC TA	56289	150D225X9020A2
A8C22	0160-3451		CAPACITOR-FXD .01UF +80–20% 100WVDC CER	28480	0160-3451
A8C23			NOT ASSIGNED		

See introduction to this section for ordering information

Table 6-2. Replaceable Parts (Cont'd)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A8CR1	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A8CR2	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A8CR3	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A8CR4	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A8L1	9140-0105		COIL-FXD MOLDED RF CHOKE 8.2UH 10%	24226	15/821
A8L2	9170-0029		CORE-SHIELDING BEAD	02114	56-590-65A2/4A
A8Q1	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A8Q2	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A8Q3	1853-0244	2	TRANSISTOR PNP SI PD=310MW FT=500MHZ	28480	1853-0244
A8Q4	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A8Q5	1855-0081		TRANSISTOR J-FET 2N5245 N-CHAN D-MODE SI	01295	2N5245
A8Q6	1854-0019	4	TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A8Q7	1853-0354		TRANSISTOR PNP SI TO-92 PD=350MW	28480	1853-0354
A8Q8	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A8Q9	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A8Q10	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A8Q11	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A8Q12	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A8Q13	1854-0691		TRANSISTOR NPN SI TO-92 PD=350MW	28480	1854-0691
A8R1	0684-3901		RESISTOR 39 10% .25W CC	01121	CB3901
A8R2	0698-3151	1	RESISTOR 2.87K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2871-F
A8R3	0757-0407		RESISTOR 200 1% .125W F	24546	C4-1/8-T0-201-F
A8R4	0684-3901		RESISTOR 39 10% .25W CC	01121	CB3901
A8R5	0757-0411		RESISTOR 332 1% .125W F TC=0+-100	24546	C4-1/8-T0-332R-F
A8R6	0684-8201	2	RESISTOR 82 10% .25W FC TC=-400/+500	01121	CB8201
A8R7	0757-0428	1	RESISTOR 1.62K 1% .125W F	24546	C4-1/8-T0-1621-F
A8R8	0684-1011		RESISTOR 100 10% .25W CC	01121	CB1011
A8R9	0684-2251	1	RESISTOR 2.2M 10% .25W FC TC=-900/+1100	01121	CB2251
A8R10			NOT ASSIGNED		
A8R11			NOT ASSIGNED		
A8R12	2100-3056	5	RESISTOR-TRMR 5K 10% C SIDE-ADJ 17-TURN	32997	3006P-1-502
A8R13	2100-3056		RESISTOR-TRMR 5K 10% C SIDE-ADJ 17-TURN	32997	3006P-1-502
A8R14	2100-3056		RESISTOR-TRMR 5K 10% C SIDE-ADJ 17-TURN	32997	3006P-1-502
A8R15	0757-0434		RESISTOR 3.65K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3651-F
A8R16	0757-0440	1	RESISTOR 7.5K 1% .125W F	24546	C4-1/8-T0-7501-F
A8R17	0698-6450	2	RESISTOR 2.5K .1% .125W F TC=0+-50	24546	NC55
A8R18	0698-5449	2	RESISTOR 5K .1% .125W F TC=0+-50	19701	MF4C1/8-T2-5001-B
A8R19	0698-4157	2	RESISTOR 10K .1% .125W F TC=0+-50	24546	NC55
A8R20	0698-6942	2	RESISTOR 25K .1% .125W F TC=0+-50	24546	NC55
A8R21	0698-5450	2	RESISTOR 50K .1% .125W F TC=0+-50	19701	MF4C1/8-T2-5002-B
A8R22	0698-4158	2	RESISTOR 100K .1% .125W F TC=0+-50	24546	NC55
A8R23	0684-1021		RESISTOR 1K 10% .25W CC	01121	CB1021
A8R24	0757-0284		RESISTOR 150 1% .125W F	24546	C4-1/8-T0-151-F
A8R25			NOT ASSIGNED		
A8R26	0684-1011		RESISTOR 100 10% .25W CC	01121	CB1011
A8R27	0684-1031		RESISTOR 10K 10% .25W CC	01121	CB1031
A8R28	0684-3321		RESISTOR 3.3K 10% .25W CC	01121	CB3321
A8R29	0684-1011		RESISTOR 100 10% .25W CC	01121	CB1021
A8R30	0757-0284		RESISTOR 150 1% .125W F	24546	C4-1/8-T0-151-F
A8R31	0757-0416		RESISTOR 511 1% .125W F	24546	C4-1/8-T0-511R-F
A8R32	0757-1093	2	RESISTOR 3K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3001-F
A8R33	0698-3150		RESISTOR 2.37K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2371-F
A8R34	0757-0283		RESISTOR 2K 1% .125W F	24546	C4-1/8-T0-2001-F
A8R35	0684-3311		RESISTOR 330 10% .25W CC	01121	CB3311
A8R36	0684-3901		RESISTOR 39 10% .25W CC	01121	CB3901
A8R37	0684-6821		RESISTOR 6.8K 10% .25W CC	01121	CB6821
A8R38	0757-0439		RESISTOR 6.81K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6811-F
A8R39	0757-0420		RESISTOR 750 1% .125W F	24546	C4-1/8-T0-751-F
A8R40	0757-0454	1	RESISTOR 33.2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3322-F
A8R41	0684-0271		RESISTOR 2.7 1% .25W CC	01121	CB27G1
A8R42	0684-0271		RESISTOR 2.7 10% .25W CC	01121	CB27G1
A8R43	2100-3056	2	RESISTOR VAR TRMR 5K 10% C SIDE ADJ	32997	3006P-1-502
A8S1MP1	01740-61901	1	SWITCH ASSY, ROTARY M	28480	01740-61901
A8S1MP2	01740-61902	1	SWITCH ASSY, ROTARY F	28480	01740-61902
A8S1MP3	01840-22502	2	ROLLER, DETENT	28480	01840-22502
A8S1MP4	1460-1148	2	SPRING: TORSION	00000	OBD
A8U1	1826-0086	1	IC AMPL	04713	MC1776CG
A8XA7	1251-0589	2	CONNECTOR 10-PIN F POST TYPE	27264	09-52-3101
A8XU1	1200-0475		SOCKET	22526	75060-005
A9	01740-66522	1	BOARD ASSY, DELAYED SWEEP	28480	01740-66522
A9C1	0160-2250	1	CAPACITOR-FXD 5.1PF +-.25PF 500WVDC CER	28480	0160-2250
A9C2	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A9C3	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A9C4	0160-2204		CAPACITOR-FXD 100PF +-5% 300WVDC	28480	0160-2204
A9C5			NOT ASSIGNED		
A9C6	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451

Table 6-2. Replaceable Parts (Cont'd)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A9C7	0140-0218		CAPACITOR-FXD 160PF +-2% 300WVDC MICA	72136	DM15F161G0300WV1CR
A9C8	0160-3226		CAPACITOR-FXD .01UF +-10% 400WVDC MET	28480	0160-3226
A9C9	0160-3726		CAPACITOR-FXD 1UF +-10% 40WVDC MET POLYC	28480	0160-3726
A9C10	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A9C11	0180-2148	1	CAPACITOR-FXD .47UF +-20% 50VDC TA	56289	150D474X0050A2
A9C12			NOT ASSIGNED		
A9C13			NOT ASSIGNED		
A9C14	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A9C15	0180-0197		CAPACITOR-FXD 2.2UF +-10% 20VDC TA	56289	150D225X9020A2
A9CR1	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A9CR2	5081-7535		DIODE- 1901-0040 PF .30	28480	5081-7535
A9L1	9140-0105		COIL-FXD MOLDED RF CHOKE 8.2UH 10%	24226	15/821
A9P1	1251-3072	1	CONNECTOR 12-PIN M POST TYPE	27264	09-56-1121
A9Q1	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A9Q2	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A9Q3	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A9Q4	1853-0244		TRANSISTOR PNP SI PD=310MW FT=500MHZ	28480	1853-0244
A9Q5	1854-0691		TRANSISTOR NPN SI T0-92 PD=350MW	28480	1854-0691
A9Q6	1855-0081		TRANSISTOR J-FET 2N5245 N-CHAN D-MODE SI	01295	2N5245
A9Q7	1854-0019		TRANSISTOR NPN SI T0-18 PD=360MW	28480	1854-0019
A9R1	0684-1021		RESISTOR- 1K 10% .25W CC	01121	CB1021
A9R2	0757-0284		RESISTOR 150 1% .125W F	24546	C4-1/8-T0-151-F
A9R3	0757-0834	1	RESISTOR 5.62K 1% .5W F TC=0+-100	19701	MF7C1/2-T0-5621-F
A9R4	0684-1011		RESISTOR 100 10% .25W CC	01121	CB1011
A9R5	0757-0193	1	RESISTOR 3.32K 1% .5W F TC=0+-100	19701	MF7C1/2-T0-3321-F
A9R6	0757-0442		RESISTOR 10K 1% .125W F	24546	C4-1/8-T0-1002-F
A9R7	0757-0280		RESISTOR 1K 1% .125W F	24546	C4-1/8-T0-1002-F
A9R8			NOT ASSIGNED		
A9R9			NOT ASSIGNED		
A9R10	2100-3056		RESISTOR-TRMR 5K 10% C SIDE-ADJ 17-TURN	32997	3006P-1-502
A9R11	2100-3056		RESISTOR-TRMR 5K 10% C SIDE-ADJ 17-TURN	32997	3006P-1-502
A9R12	0757-0433		RESISTOR 3.32K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3321-F
A9R13	0757-0440		RESISTOR 7.5K 1% .125W F	24546	C4-1/8-T0-7501-F
A9R14	0698-6450		RESISTOR 2.5K .1% .125W F TC=0+-50	24546	NC55
A9R15	0698-5449		RESISTOR 5K .1% .125W F TC=0+-50	19701	MF4C1/8-T2-5001-B
A9R16	0698-4157		RESISTOR 10K .1% .125W F TC=0+-50	24546	NC55
A9R17	0698-6942		RESISTOR 25K .1% .125W F TC=0+-50	24546	NC55
A9R18	0698-5450		RESISTOR 50K .1% .125W F TC=0+-50	19701	MF4C1/8-T2-5002-B
A9R19	0698-4158		RESISTOR 100K .1% .125W F TC=0+-50	24546	NC55
A9R20	0757-0284		RESISTOR 150 1% .125W F	24546	C4-1/8-T0-151-F
A9R21	0683-0475		RESISTOR 4.7 5% .25W FC TC=-400/+500	01121	CB47G5
A9R22	0684-1011		RESISTOR 100 10% .25W CC	01121	CB1011
A9R23	0684-1031		RESISTOR 10K 10% .25W CC	01121	CB1031
A9R24	0757-0400	1	RESISTOR 90.9 1% .125W F TC=0+-100	24546	C4-1/8-T0-90R9-F
A9R25	0684-1001		RESISTOR 10 10% .25W CC	01121	CB1001
A9R26			NOT ASSIGNED		
A9R27	0683-0275	1	RESISTOR 2.7 5% .25W FC TC=-400/+500	01121	CB27G5
A9R28	2100-3056		RESISTOR-VAR TRMR 5K 10% C SIDE ADJ	32997	3006P-1-502
A9S1MP1	01740-61903	1	SWITCH ASSY, ROTARY M	28480	01740-61903
A9S1MP2	01740-61904	1	SWITCH ASSY, ROTARY F	28480	01740-61904
A9S1MP3	01840-22502		ROLLER, DETENT	28480	01840-22502
A9S1MP4	1460-1148		SPRING: TORSION	00000	OBD
A9U1	1826-0045		IC AMPL	28480	1826-0045
A9XA10	1251-3352	3	CONNECTOR-PC EDGE 12-CONT/ROW 1-ROW	26742	91-6912-0702-00
A9XU1	1200-0475		SOCKET	22526	75060-005
A10	01740-66508	1	BOARD ASSY, DELAYED TRIGGER	28480	01740-66508
A10C1	0150-0070		CAPACITOR-FXD .02UF +-20% 500WVDC CER	28480	0150-0070
A10C2	0160-2204		CAPACITOR-FXD 100PF +-5% 300WVDC MICA	28480	0160-2204
A10C3	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A10C4	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A10C5			NOT ASSIGNED		
A10C6	0160-2204		CAPACITOR-FXD 100PF +-5% 300WVDC MICA	28480	0160-2204
A10C7	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A10C8	0180-0197		CAPACITOR-FXD 2.2UF +-10% 20VDC TA	56289	150D225X9020A2
A10C9	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A10C10	0180-0197		CAPACITOR-FXD 2.2UF +-10% 20VDC TA	56289	150D225X9020A2
A10C11	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A10C12	0180-0197		CAPACITOR-FXD 2.2UF +-10% 20VDC TA	56289	150D225X9020A2
A10C13	0150-0048	2	CAPACITOR-FXD .22PF +-5% 500WVDC TI DIOX	95121	TYPE QC
A10C14	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A10CR1	1901-0040		DIODE-SWITCHING 30V 50MA 2NS D0-35	28480	1901-0040
A10CR2	1901-0040		DIODE-SWITCHING 30V 50MA 2NS D0-35	28480	1901-0040
A10CR3	1901-0040		DIODE-SWITCHING 30V 50MA 2NS D0-35	28480	1901-0040
A10CR4	1901-0040		DIODE-SWITCHING 30V 50MA 2NS D0-35	28480	1901-0040
A10CR5			NOT ASSIGNED		
A10CR6	1901-0040		DIODE-SWITCHING 30V 50MA 2NS D0-35	28480	1901-0040
A10CR7	1901-0040		DIODE-SWITCHING 30V 50MA 2NS D0-35	28480	1901-0040

Table 6-2. Replaceable Parts (Cont'd)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A10CR8	1910-0016		DIODE-GE 60V 60NA 1US D0-7	28480	1920-0016
A10L1	9140-0105		COIL-FXD MOLDED RF CHOKE 8.2UH 10%	24226	15/821
A10P1			NSR		
A10Q1	1855-0202	1	TRANSISTOR-JFET DUAL N-CHAN D-MODE SI	17856	E421
A10Q2			NOT ASSIGNED		
A10Q3	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A10Q4	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A10Q5	1854-0092		TRANSISTOR NPN SI PD=200MW FT=600MHZ	28480	1854-0092
A10Q6	1854-0092		TRANSISTOR NPN SI PD=200MW FT=600MHZ	28480	1854-0092
A10Q7	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A10Q8	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A10Q9	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A10Q10	1853-0036		TRANSISTOR PNP SI PD=310MW FT-250MHZ	28480	1853-0036
A10R1	0757-0465		RESISTOR 100K 1% .125W F	24546	C4-1/8-T0-1003-F
A10R2	0757-0488		RESISTOR 909K 1% .125W F TC=0+–100	24546	NA4
A10R3	0684-3901		RESISTOR 39 10% .25W CC	01121	CB3901
A10R4	0684-3901		RESISTOR 39 10% .25W CC	01121	CB3901
A10R5	0757-0407		RESISTOR 200 1% .125W F	24546	C4-1/8-T0-201-F
A10R6	0684-6811		RESISTOR 680 10% .25W FC TC=–400/+600	01121	CB6811
A10R7	0757-0407		RESISTOR 200 1% .125W F	24546	C4-1/8-T0-201-F
A10R8	0684-4721		RESISTOR 4.7K 10% .25W CC	01121	CB4721
A10R9	2100-3351		RESISTOR-VAR TRMR 500 OHM 10% C SIDE ADJ	73138	72XR500
A10R10	2100-3434		RESISTOR-VAR CONTROL CC 50K 10% LIN	01121	70M4N048P503U
A10R11	0757-0283	3	RESISTOR 2K 1% .125W F TC=0+–100	24546	C4-1/8-T0-2001-F
A10R12			NOT ASSIGNED		
A10R13	0757-0408		RESISTOR 243 1% .125W F TC=0+–100	24546	C4-1/8-T0-243R-F
A10R14	0684-4721		RESISTOR 4.7K 10% .25W CC	01121	CB4721
A10R15	0757-0427		RESISTOR 1.5K 1% .125W F TC=0+–100	24546	C4-1/8-T0-1501-F
A10R16	0698-3433		RESISTOR 28.7 1% .125W F TC=0+–100	03888	PME55-1/8-T0-28R7-F
A10R17	0698-3433		RESISTOR 28.7 1% .125W F TC=0+–100	03888	PME55-1/8-T0-28R7-F
A10R18	0698-3152		RESISTOR 3.48K 1% .125W F	16299	C4-1/8-T0-3481-F
A10R19	0757-0438		RESISTOR 5.11K 1% .125W F	24546	C4-1/8-T0-5111-F
A10R20	0684-1531	1	RESISTOR 15K 10% .25W FC TC=–400/+800	01121	CB1531
A10R21	5081-7482		RESISTOR -0757-0420 PF .40	28480	5081-7482
A10R22	0757-0443		RESISTOR 11K 1% .125W F TC=0+–100	24546	C4-1/8-T0-1102-F
A10R23	0757-0420		RESISTOR 750 1% .125W F	24546	C4-1/8-T0-751-F
A10R24	0757-0438		RESISTOR 5.11K 1% .125W F	24546	C4-1/8-T0-5111-F
A10R25	0684-6811		RESISTOR 680 10% .25W FC TC=–400/+600	01121	CB6811
A10R26	0684-6811		RESISTOR 680 10% .25W FC TC=–400/+600	01121	CB6811
A10R27	0757-0200		RESISTOR 5.62K 1% .125W F TC=0+–100	24546	C4-1/8-T0-5621-F
A10R28	0757-0420		RESISTOR 750 1% .125W F	24546	C4-1/8-T0-751-F
A10R29	0757-0418		RESISTOR 619 1% .125W F	24546	C4-1/8-T0-619R-F
A10R30	0757-0433		RESISTOR 3.32K 1% .125W F TC=0+–100	24546	C4-1/8-T0-3321-F
A10R31	0757-0443		RESISTOR 11K 1% .125W F TC=0+–100	24546	C4-1/8-T0-1102-F
A10R32	0757-0420		RESISTOR 750 1% .125W F	24546	C4-1/8-T0-751-F
A10R33	0684-1001		RESISTOR 10 10% .25W CC	01121	CB1001
A10R34	0684-1001		RESISTOR 10 10% .25W CC	01121	CB1001
A10R35	0684-3901		RESISTOR 39 10% .25W CC	01121	CB3901
A10R36	0698-0085		RESISTOR 2.61K 1% .125W F TC=0+–100	16299	C4-1/8-T0-2611-F
A10R37	0757-0488		RESISTOR 909K 1% .125W F TC=0+–100	24546	NA4
A10R38	0757-0465		RESISTOR 100K 1% .125W F	24546	C4-1/8-T0-1003-F
A10R39	0684-1011	3	RESISTOR 100 10% .25W FC TC=–400/+500	01121	CB1011
A10R40	0684-1011		RESISTOR 100 10% .25W FC TC=–400/+500	01121	CB1011
A10R41	0757-0428		RESISTOR 1.62K 1% .125W F TC=0+–100	24546	C4-1/8-T0-1621-F
A10S1	3101-1904	1	SWITCH-PB 6STA .394 IN-CTRS .45A 115VAC	28480	3101-1904
A10U1	5081-3019		INTEGRATED CIRCUIT, SEALED PACKAGE	28480	5081-3019
A10VR1	1902-3082	1	DIODE-ZENER 4.64V PD=.4W	04713	SZ10939-86
A11	01740-66521	1	BOARD ASSY, HORIZONTAL OUTPUT	28480	01740-66521
A11C1	0160-3451		CAPACITOR-FXD .01UF +80–20% 100WVDC CER	28480	0160-3451
A11C2	0160-3451		CAPACITOR-FXD .01UF +80–20% 100WVDC CER	28480	0160-3451
A11C3	0160-3665	7	CAPACITOR-FXD .01UF +80–20% 500WVDC CER	28480	0160-3665
A11C4	0160-3502	1	CAPACITOR-FXD .3PF +–5% 500WVDC TI DIOX	95121	TYPE QC
A11C5	0160-3665		CAPACITOR-FXD .01UF +80–20% 500WVDC CER	28480	0160-3665
A11C6	0140-0192		CAPACITOR-FXD 68PF +–5% 300WVDC MICA	72136	DM15E680J0300WV1CR
A11C7	0160-3665		CAPACITOR-FXD .01UF +80–20% 500WVDC CER	28480	0160-3665
A11C8	0160-3665		CAPACITOR-FXD .01UF +80–20% 500WVDC CER	28480	0160-3665
A11C9	0140-0192		CAPACITOR-FXD 68PF +–5% 300WVDC MICA	72136	DM15E680J0300WV1CR
A11C10	0160-3665		CAPACITOR-FXD .01UF +80–20% 500WVDC CER	28480	0160-3665
A11C11	0160-3665		CAPACITOR-FXD .01UF +80–20% 500WVDC CER	28480	0160-3665
A11C12	0160-3665		CAPACITOR-FXD .01UF +80–20% 500WVDC CER	28480	0160-3665
A11C13	0160-3502		CAPACITOR-FXD .30PF +–5% 500WVDC	95121	TYPE QC
A11C14	0140-0192		CAPACITOR-FXD 68PF +–5% 300WVDC	72136	DM15E680J0300WV1CR
A11L1	9170-0029		CORE-SHIELDING BEAD	02114	56-590-65A2/4A
A11L2	9170-0029		CORE-SHIELDING BEAD	02114	56-590-65A2/4A
A11MP1	1205-0095	6	HEAT-DISSIPATOR SGL T0-5/T0-39 PKG	28480	1205-0095
A11Q1	1854-0019		TRANSISTOR NPN SI T0-18 PD=360MW	28480	1854-0019
A11Q2	1853-0354		TRANSISTOR PNP SI T0-92 PD=350MW	28480	1853-0354

Table 6-2. Replaceable Parts (Cont'd)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A11Q3	1854-0419	1	TRANSISTOR NPN SI T0-39 PD=1W FT=200MHZ	28480	1854-0419
A11Q4	1853-0038	1	TRANSISTOR PNP SI T0-39 PD=1W FT=100MHZ	28480	1853-0038
A11Q5	1853-0354		TRANSISTOR PNP SI T0-92 PD-350MW	28480	1853-0354
A11Q6	1854-0019		TRANSISTOR NPN SI T0-18 PD=360MW	28480	1854-0019
A11Q7	1853-0232	2	TRANSISTOR PNP SI T0-39 PD=1W FT=200MHZ	28480	1853-0232
A11Q8	1854-0523	1	TRANSISTOR NPN SI T0-39 PD=1W FT=150MHZ	28480	1854-0523
A11R1	0684-1001		RESISTOR 10 10% .25W CC	01121	CB1001
A11R2	0684-1011		RESISTOR 100 10% .25W CC	01121	CB1011
A11R3	0684-1001		RESISTOR 10 10% .25W CC	01121	CB1001
A11R4	0757-0845	4	RESISTOR 18.2K 1% .5W F TC=0+-100	19701	MF7C1/2-T0-1822-F
A11R5	0684-4721		RESISTOR 4.7K 10% .25W CC	01121	CB4721
A11R6	0683-0685	2	RESISTOR 6.8 5% .25W FC	01121	CB68G5
A11R7	0684-3901		RESISTOR 39 10% .25W CC	01121	CB3901
A11R8	0683-6835	2	RESISTOR 68K 5% .25W FC TC=-400/+800	01121	CB6835
A11R9	0757-0407	2	RESISTOR 200 1% .125W F TC=0+-100	24546	C4-1/8-T0-201-F
A11R10	2100-3273	3	RESISTOR-VAR TRMR 2K OHM 10% C SIDE ADJ	73138	72XR2K
A11R11	0757-0768	2	RESISTOR 47.5K 1% .25W F	24546	C5-1/4-T0-4752-F
A11R12	0757-0283		RESISTOR 2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2001-F
A11R13	0757-0411		RESISTOR 332 1% .125W F TC=0+-100	24546	C4-1/8-T0-332R-F
A11R14	0683-6835		RESISTOR 68K 5% .25W FC TC=-400/+800	01121	CB6835
A11R15	2100-3273		RESISTOR-VAR TRMR 2K OHM 10% C SIDE ADJ	73138	72XR2K
A11R16	0757-0407		RESISTOR 200 1% .125W F TC=0+-100	24546	C4-1/8-T0-201-F
A11R17	0757-0768		RESISTOR 47.5K 1% .25W F	24546	C5-1/4-T0-4752-F
A11R18	0757-0283		RESISTOR 2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2001-F
A11R19	0757-0411		RESISTOR 332 1% .125W F TC=0+-100	24546	C4-1/8-T0-332R-F
A11R20	0683-0685		RESISTOR 6.8 5% .25W FC	01121	CB68G5
A11R21	0684-3901		RESISTOR 39 10% .25W CC	01121	CB3901
A11R22	0684-4721		RESISTOR 4.7K 10% .25W CC	01121	CB4721
A11R23	0757-0845		RESISTOR 18.2K 1% .5W F TC=0+-100	19701	MF7C1/2-T0-1822-F
A11R24	0683-1825	1	RESISTOR 1.8K 5% .25W FC TC=-400/+700	01121	CB1825
A11R25	0757-0845		RESISTOR 18.2K 1% .5W F TC=0+-100	19701	MF7C1/2-T0-1822-F
A11R26	0757-0845		RESISTOR 18.2K 1% .5W F TC=0+-100	19701	MF7C1/2-T0-1822-F
A11XA7	1251-0649	2	CONNECTOR 15-PIN F POST TYPE	27264	09-52-3151
A12	01740-66503	1	BOARD ASSY, GATE AMPLIFIER	28480	01740-66503
A12C1	0180-0230		CAPACITOR-FXD 1UF +-20% 50VDC TA-SOLID	56289	150D105X0050A2
A12C2	0160-0165	3	CAPACITOR-FXD .056UF +-10% 200WVDC POLYE	56289	292P56392
A12C3	0160-3665		CAPACITOR-FXD .01UF +-20% 500WVDC CER	28480	0160-3665
A12C4	0160-3665		CAPACITOR-FXD .01UF +-20% 500WVDC CER	28480	0160-3665
A12C5	0160-0165		CAPACITOR-FXD .056UF +-10% 200WVDC POLYE	56289	292P56392
A12C6	0160-3452		CAPACITOR-FXD .02UF +-20% 100WVDC CER	28480	0160-3452
A12C7	0140-0196		CAPACITOR-FXD 150PF +-5% 300WVDC MICA	72136	DM15F151J0300WV1CR
A12C8			NOT ASSIGNED		
A12C9	0160-3452		CAPACITOR-FXD .02UF +-20% 100WVDC CER	28480	0160-3452
A12C10	0160-3452		CAPACITOR-FXD .02UF +-20% 100WVDC CER	28480	0160-3452
A12C11	0121-0478	1	CAPACITOR-VAR TE 0.25-1.5 PF	28480	0121-0478
A12CR1	1901-0040		DIODE-SWITCHING 30V 50MA 2NS D0-35	28480	1901-0040
A12CR2	1901-0040		DIODE-SWITCHING 30V 50MA 2NS D0-35	28480	1901-0040
A12CR3	1901-0040		DIODE-SWITCHING 30V 50MA 2NS D0-35	28480	1901-0040
A12MP1	1205-0095		HEAT-DISSIPATOR SGL T0-5/T0-39 PKG	28480	1205-0095
A12MP2	01801-01206	2	BRACKET, ANGLE	28480	01801-01206
A12P1	1251-3319	1	CONNECTOR 10-PIN M POST TYPE	27264	09-64-1101(A2402-10A)
A12Q1	1853-0015		TRANSISTOR PNP SI PD=200MW FT=500MHZ	28480	1853-0015
A12Q2	1853-0232		TRANSISTOR PNP SI T0-39 PD=1W FT=200MHZ	28480	1853-0232
A12Q3	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A12Q4	1854-0271	1	TRANSISTOR NPN SI T0-39 PD=1W FT=150MHZ	28480	1854-0271
A12R1	0684-1231	2	RESISTOR 12K 10% .25W FC TC=-400/+800	01121	CB1231
A12R2	0757-0422		RESISTOR 909 1% .125W F TC=0+-100	24546	C4-1/8-T0-909R-F
A12R3	2100-3423	1	RESISTOR-VAR CONTROL CC 10K 20% LIN	28480	2100-3423
A12R4	0698-3152	1	RESISTOR 3.48K 1% .125W F TC=0+-100	16299	C4-1/8-T0-3481-F
A12R5	0698-3159	1	RESISTOR 26.1K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2612-F
A12R6	0698-3158		RESISTOR 23.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2372-F
A12R7	0757-0124		RESISTOR 39.2K 1% .125W F TC=0+-100	24546	C5-1/4-T0-3922-F
A12R8	0757-0440	1	RESISTOR 7.5K 1% .125W F	24546	C4-1/8-T0-7501-F
A12R9	0757-0737	1	RESISTOR 1.62K 1% .25W F TC=0+-100	24546	C5-1/4-T0-1621-F
A12R10	0698-3646	1	RESISTOR 12K 5% 2W MO TC=0+-200	16299	FP42-2-T00-1202-J
A12R11	0757-0435		RESISTOR 3.92K 1% .125W F	24546	C4-1/8-T0-3921-F
A12R12	2100-3273		RESISTOR-VAR TRMR 2K OHM 10% C SIDE ADJ	73138	72XR2K
A12R13	0757-0843	1	RESISTOR 15K 1% .5W F TC=0+-100	19701	MF7C1/2-T0-1502-F
A12R14	0687-1211	1	RESISTOR 120 10% .5W CC TC=0+529	01121	EB1211
A12R15	0684-1021		RESISTOR 1K 10% .25W CC	01121	CB1021
A12R16	2100-3353	1	RESISTOR-VAR TRMR 20K OHM 10% C SIDE ADJ	73138	72XR20K
A12R17	0684-1021		RESISTOR 1K 10% .25W CC	01121	CB1021
A12R18	0684-4731	1	RESISTOR 47K 10% .25W CC	01121	CB4731
A12R19	0684-3931	2	RESISTOR 39K 10% .25W FC TC=-400/+800	01121	CB3931
A12R20	0684-3331		RESISTOR 33K 10% .25W CC	01121	CB3331
A12R21	0684-2211	1	RESISTOR 220 10% .25W FC TC=-400/+600	01121	CB2211
A12R22	2100-3424	1	RESISTOR, VAR 5M 30% CC	28480	2100-3424
A12S1	3101-1767	1	SWITCH-PB DPDT MOM 1A 300VAC	28480	3101-1767
A12U1	1821-0001		IC CA3046 XSTR ARRAY	02735	CA3046
A12VR1	1902-0025	2	DIODE-ZNR 10V 5% D0-7 PD=.4W TC=+.06%	04713	SZ 10939-182
A12VR2	1902-3345	1	DIODE-ZNR 51.1V 5% D0-7 PD=.4W TC=+.081%	04713	SZ 10939-386

See introduction to this section for ordering information.

Table 6-2. Replaceable Parts (Cont'd)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A12XA16	1251-0649		CONNECTOR 15-PIN F POST TYPE	27264	09-52-3151
A12XU1	1200-0441		SOCKET-IC 14-CONT DIP-SLDR-TERMS	00779	583527-1
A13	01740-66516	1	BOARD ASSY, VERTICAL CONTROL SWITCHING	28480	01740-66516
A13R1	0757-0282	2	RESISTOR 221 1% .125W F	07716	CEA-993
A13R2	0757-0282		RESISTOR 221 1% .125W F	07716	CEA-993
A13S1	3101-1908	1	SWITCH-PB 2STA 4PDT INTLH .394 IN-CTRS	28480	3101-1908
A13S2	3101-1907		SWITCH-PB 4STA INTLH .394 IN-CTRS .45A	28480	3101-1907
A13XA3P3	1251-3900	2	CONNECTOR 8-PIN F POST TYPE	27264	09-52-3083
A13XA3P4	1251-3900		CONNECTOR 8-PIN F POST TYPE	27264	09-52-3083
A14	01740-66504	1	BOARD ASSY, INTERFACE	28480	01740-66504
A14 OPTION 101	01740-66514	1	BOARD ASSY, INTERFACE; OPTION 101 STATE DISPLAY	28480	01740-66514
A14XA3	1251-0477		CONNECTOR-PC EDGE 12-CONT/ROW 1-ROW	9D949	143-012-07-109
A14XA7	1251-0213	2	CONNECTOR-PC EDGE 15-CONT/ROW 1-ROW	9D949	143-015-07-109
A14XA16	1251-3852	2	CONNECTOR 15-PIN F POST TYPE	27264	09-52-3153
A14C1	0140-0200	1	CAPACITOR-FXD 390PF +-5% 300WVDC MICA	72136	DM15F391J0300WV1CR
A14C2	0140-0178	1	CAPACITOR-FXD 560PF +-2% 300WVDC MICA	72136	DM15F561G0300WV1CR
A14CR1	1901-0040		DIODE-SWITCHING 30V 50NA 2NS D0-35	28480	1901-0040
A14CR2	1901-0040		DIODE-SWITCHING 30V 50NA 2NS D0-35	28480	1901-0040
A14CR3	1901-0040		DIODE-SWITCHING 30V 50NA 2NS D0-35	28480	1901-0040
A14CR4	1901-0040		DIODE-SWITCHING 30V 50NA 2NS D0-35	28480	1901-0040
A14CR5	1901-0040		DIODE-SWITCHING 30V 50NA 2NS D0-35	28480	1901-0040
A14CR6	1901-0040		DIODE-SWITCHING 30V 50NA 2NS D0-35	28480	1901-0040
A14CR7	1901-0040		DIODE-SWITCHING 30V 50NA 2NS D0-35	28480	1901-0040
A14CR8	1901-0040		DIODE-SWITCHING 30V 50NA 2NS D0-35	28480	1901-0040
A14Q1	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A14Q2	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A14Q3	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A14Q4	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A14Q5	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A14R1	0698-3155		RESISTOR 4.64K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4641-F
A14R2	0684-1031	1	RESISTOR 10K 10% .25W FC TC=-400/+700	01121	CB1031
A14R3	0757-0290	1	RESISTOR 6.19K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-6191-F
A14R4	0757-0280	4	RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A14R5	0757-0394	2	RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A14R6	0757-0394		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A14R7	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A14R8	0757-0433		RESISTOR 3.32K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3321-F
A14R9	0757-0278	1	RESISTOR 1.78K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1781-F
A14R10	0684-1011		RESISTOR 100 10% .25W FC TC=-400/+500	01121	CB1011
A14R11	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A14R12	0757-0439		RESISTOR 6.81K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6811-F
A14R13	0757-0408		RESISTOR 243 1% .125W F TC=0+-100	24546	C4-1/8-T0-243R-F
A14R14	0757-0434		RESISTOR 3.65K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3651-F
A14R15	0757-0408		RESISTOR 243 1% .125W F TC=0+-100	24546	C4-1/8-T0-243R-F
A14R16	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A14R17	0757-0439		RESISTOR 6.81K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6811-F
A14R18	0757-0433		RESISTOR 3.32K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3321-F
A14XA3	1251-0477		CONNECTOR-PC EDGE 12-CONT/ROW 1-ROW	9D949	143-012-07-109
A14XA7	1251-0213		CONNECTOR-PC EDGE 15-CONT/ROW 1-ROW	9D949	143-015-07-109
A14XA16	1251-3852		CONNECTOR 15-PIN F POST TYPE	27264	09-52-3153
A15	01740-66502	1	BOARD ASSY, HV POWER SUPPLY	28480	01740-66502
A15C1	0180-1794	1	CAPACITOR-FXD 22UF +-10% 35VDC TA-SOLID	56289	150D226X9035R2
A15C2	0160-2264	1	CAPACITOR-FXD 20PF +-5% 500WVDC CER	28480	0160-2264
A15C3	0180-0269	1	CAPACITOR-FXD 1UF +75-10% 150VDC AL	56289	30D105G150BA2
A15C4	0160-0684	2	CAPACITOR-FXD 1000PF +-20% 4000WVDC MET	84411	HEW337
A15C5	0160-4051	1	CAPACITOR-FXD .01UF +-20% 4000WVDC MET	84411	HEW-337
A15C6	0160-0544	1	CAPACITOR-FXD .022UF +-20% 4000WVDC MET	84411	HEW-337
A15C7	0160-0584	1	CAPACITOR-FXD .068UF +-20% 4000WVDC MET	56289	430P683040
A15C8	0160-0684		CAPACITOR-FXD 1000PF +-20% 4000WVDC MET	84411	HEW-337
A15C9	0160-4079	1	CAPACITOR-FXD 1500PF +-20% 4000WVDC MET	28480	0160-4079
A15C10	0180-0197		CAPACITOR-FXD 2.2UF +-10% 20VDC TA	56289	150D225X9020A2
A15C11	0180-0197		CAPACITOR-FXD 2.2UF +-10% 20VDC TA	56289	150D225X9020A2
A15C12	0170-0040		CAPACITOR-FXD .047UF +-10% 200WVDC POLYE	56289	292P47392
A15C13	0160-3443		CAPACITOR-FXD .1UF +80-20% 50WVDC POLYE	28480	0160-3443
A15C14	0160-0165		CAPACITOR-FXD .056UF +-10% 200WVDC POLYE	56289	292P56392
A15C15	0180-0230		CAPACITOR-FXD 1UF +-20% 50VDC TA-SOLID	56289	150D105X0050A2
A15C16	0160-0168		CAPACITOR-FXD .1UF +-10% 200WVDC POLYE	56289	292P10492
A15C17	0180-0230		CAPACITOR-FXD 1UF +-20% 50VDC TA-SOLID	56289	150D105X0050A2
A15CR1	1901-0028	6	DIODE-PWR RECT 400V 750NA D0-29	04713	SR1358-9
A15CR2	1901-0028		DIODE-PWR RECT 400V 750NA D0-29	04713	SR1358-9
A15CR3	1901-0028		DIODE-PWR RECT 400V 750NA D0-29	04713	SR1358-9
A15CR4	1901-0028		DIODE-PWR RECT 400V 750NA D0-29	04713	SR1358-9
A15CR5	1901-0028		DIODE-PWR RECT 400V 750NA D0-29	04713	SR1358-9
A15CR6	1901-0028		DIODE-PWR RECT 400V 750NA D0-29	04713	SR1358-9
A15CR7	1901-0683	1	DIODE-HV RECT 10KV 5NA 250NS	28480	1901-0683

See introduction to this section for ordering information

Table 6-2. Replaceable Parts (Cont'd)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A15DS1	2140-0013	2	LAMP-GLOW T-2 BULB 57V	74276	NE23A
A15DS2	2140-0013		LAMP-GLOW T-2 BULB 57V	74276	NE23A
A15E1	2110-0269	4	FUSEHOLDER, CLIP TYPE .25 FUSE	91506	6008-32CN
A15F1	2110-0007	2	FUSE 1A 250V SLO-BLO 1.25X.25UL	71400	MDL-1
A15L1	9140-0171	1	COIL-FXD MOLDED RF CHOKE 40UH 10%	06560	10608-1
A15L2	9140-0210	1	COIL-FXD MOLDED RF CHOKE 100UH 5%	24226	15/103
A15L3	9140-0129	1	COIL-FXD MOLDED RF CHOKE 220UH 5%	24226	15/223
A15MP1	5040-0402	1	MOUNT: TRANSFORMER	28480	5040-0402
A15MP2	5040-0430	1	MOUNT: TRANSFORMER	28480	5040-0430
A15Q1	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A15Q2	1853-0066	1	TRANSISTOR PNP SI T0-92 PD=200MW	28480	1853-0066
A15R1	0684-1021		RESISTOR 1K 10% .25W CC	01121	CB1021
A15R2	2100-3253		RESISTOR-VAR TRMR 50K OHM 10% C TOP ADJ	73138	72PR50K
A15R3	0757-0485	1	RESISTOR 681K 1% .125W F TC=0+-100	24546	NA4
A15R4	0684-1031		RESISTOR 10K 10% .25W CC	01121	CB1031
A15R5	0684-2221		RESISTOR 2.2K 10% .25W CC	01121	CB2221
A15R6	0684-2221		RESISTOR 2.2K 10% .25W CC	01121	CB2221
A15R7	0698-0061	1	RESISTOR 55.5 1% .25W F TC=0+-100	91637	CMF-1/4-T1-55R5-F
A15R8	0684-2221		RESISTOR 2.2K 10% .25W CC	01121	CB2221
A15R9	0684-4721		RESISTOR 4.7K 10% .25W CC	01121	CB4721
A15R10	0683-1065	1	RESISTOR 10M 5% .25W FC TC=-900/+1100	01121	CB1065
A15R11	0687-1531	1	RESISTOR 15K 10% .5W CC TC=0+765	01121	EB1531
A15R12	0687-3301	1	RESISTOR 33 10% .5W CC TC=0+412	01121	EB3301
A15R13	0698-8018	1	RESISTOR 30M 1% 3W CP TC=0+-100	03888	PVC175-3-T0-3004-F
A15R14	0684-6831	1	RESISTOR 68K 10% .25W FC TC=-400/+800	01121	CB6831
A15R15	0698-5353	1	RESISTOR 8.25M 5% 1W CF TC=-360/-700	28480	0698-5353
A15R16	0698-6580	1	RESISTOR 16.25M 5% 1W CF TC=-360/-700	28480	0698-6580
A15R17	0687-1011	1	RESISTOR 100 10% .5W CC TC=0+529	01121	EB1011
A15R18	0687-5611	1	RESISTOR 560 10% .5W CC TC=0+529	01121	EB5611
A15R19			NOT ASSIGNED		
A15R20	0683-2265	1	RESISTOR 22M 5% .25W FC TC=-900/+1200	01121	CB2265
A15R21	0757-0488		RESISTOR 909K 1% .125W F TC=0+-100	24546	NA4
A15R22	0757-0469	1	RESISTOR 150K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1503-F
A15R23	0684-1041		RESISTOR 100K 10% .25W CC	01121	CB1041
A15R24	0684-1041		RESISTOR 100K 10% .25W CC	01121	CB1041
A15R25	0684-3931		RESISTOR 39K 10% .25W FC TC=-400/+800	01121	CB3931
A15R26	2100-3355	1	RESISTOR-VAR TRMR 100K OHM 10% C SIDE ADJ	73138	72XR100K
A15R27	2100-3207	1	RESISTOR-TRMR 5K 10% C SIDE-ADJ 1-TURN	32997	86X-1-502
A15R28	0684-1011		RESISTOR 100 10% .25W CC	01121	CB1011
A15R29	0757-0914	1	RESISTOR 390 2% .125W F TC=0+ -100	24546	C4-1/8-T0-391-G
A15R30	0684-4721	1	RESISTOR 4.7K 10% .25W FC TC=-400/+700	01121	CB4721
A15R31	0757-0453		RESISTOR 30.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3012-F
A15R32	0757-0471	1	RESISTOR 182K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1823-F
A15T1	01740-61101	1	TRANSFORMER ASSY, H.V.	28480	01740-61101
A15U1	1826-0167	1	IC CA3094AT SWITCH	02735	CA3094AT
A15VR1	1902-3256	1	DIODE-ZNR 23.7V 5% D0-7 PD=.4W TC=+.076%	04713	SZ 10939-290
A15XA12	1251-0589		CONNECTOR 10-PIN F POST TYPE	27264	09-52-3101
A16	01740-66529	1	BOARD ASSY, LV POWER SUPPLY	28480	01740-66529
A16C1	0140-0208	1	CAPACITOR-FXD 680PF +-5% 300WVDC MICA	72136	DM15F681J0300WV1CR
A16C2	0160-0168		CAPACITOR-FXD .1UF +-10% 200WVDC POLYE	56289	292P10492
A16C3	0180-1827	1	CAPACITOR-FXD 50UF +50-10% 255VDC AL	56289	39D506F250JE4
A16C4	0180-0089	1	CAPACITOR-FXD 10UF +50-10% 150VDC AL	56289	30D106F150DD2
A16C5	0180-1866	1	CAPACITOR-FXD 500UF +75-10% 75VDC AL	56289	39D507G075HL4
A16C6	0180-0091	1	CAPACITOR-FXD 10UF +50-10% 100VDC AL	56289	30D106F100DC2
A16C7	0180-2500	1	CAPACITOR-FXD 1500UF +50-10% 16VDC AL	28480	0180-2500
A16C8	0180-0583	1	CAPACITOR-FXD 6000UF +75-10% 30VDC AL	28480	0180-0583
A16C9	0160-2211	3	CAPACITOR-FXD 510PF +-5% 300WVDC MICA	28480	0160-2211
A16C10	0180-0059	2	CAPACITOR-FXD 10UF +75-10% 25VDC AL	56289	30D106G025BB2
A16C11	0180-0443	1	CAPACITOR-FXD 5300UF +75-10% 15VDC AL	28480	0180-0443
A16C12	0160-2211		CAPACITOR-FXD 510PF +-5% 300WVDC MICA	28480	0160-2211
A16C13	0180-0341	1	CAPACITOR-FXD 25UF +75-10% 12VDC AL	56289	30D256G012BB2
A16C14	0180-0576	1	CAPACITOR-FXD 3500UF +75-10% 30VDC AL	56289	39D596
A16C15	0160-2211		CAPACITOR-FXD 510PF +-5% 300WVDC MICA	28480	0160-2211
A16C16	0180-0059		CAPACITOR-FXD 10UF +75-10% 25VDC AL	56289	30D106G025BB2
A16C17	0180-0039	1	CAPACITOR-FXD 100UF +75-10% 12VDC AL	56289	30D107G012CC2
A16C18	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A16C19	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A16C20	0180-0106		CAPACITOR-FXD 60UF +-20% 6VDC TA-SOLID	56289	150D606X0006B2
A16CR1	1906-0006	5	DIODE-MULT FULL WAVE BRIDGE RECTIFIER	28480	1906-0006
A16CR2	1906-0006		DIODE-MULT FULL WAVE BRIDGE RECTIFIER	28480	1906-0006
A16CR3	1906-0006		DIODE-MULT FULL WAVE BRIDGE RECTIFIER	28480	1906-0006
A16CR4	1906-0048	1	DIODE-FULL WAVE BRIDGE 100V 5A	83701	PE10
A16CR5	1906-0006		DIODE-MULT FULL WAVE BRIDGE RECTIFIER	28480	1906-0006
A16CR6	1906-0006		DIODE-MULT FULL WAVE BRIDGE RECTIFIER	28480	1906-0006
A16CR7	1901-0040		DIODE-SWITCHING 30V 50MA 2NS D0-35	28480	1901-0040
A16E1	2110-0269		FUSEHOLDER, CLIP TYPE .25 FUSE	91506	6008-32CN
A16P1	1251-3902	1	CONNECTOR 12-PIN M POST TYPE	27264	09-65-1121
A16P2	1251-3401	1	CONNECTOR 15-PIN M POST TYPE	27264	09-66-1151
A16P3	1251-3901		CONNECTOR 15-PIN M POST TYPE	27264	09-65-1151
A16P4	1251-3750		CONNECTOR 10-PIN M POST TYPE	27264	09-65-1101
A16Q1	1853-0336	2	TRANSISTOR PNP SI PD=625MW FT=50MHZ	04713	MPSA92

See introduction to this section for ordering information

Table 6-2. Replaceable Parts (Cont'd)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A16Q2	1853-0336		TRANSISTOR PNP SI PD=625MW FT=50MHZ	04713	MPSA92
A16Q3	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS3611
A16Q4	1854-0575	1	TRANSISTOR NPN SI PD=625MW FT=50MHZ	04713	MPS-A42
A16Q5	1853-0080	2	TRANSISTOR PNP SI PD=300MW FT=30MHZ	28480	1853-0080
A16Q6	1853-0080		TRANSISTOR PNP SI PD=300MW FT=30MHZ	28480	1853-0080
A16Q7	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS3611
A16Q8	1854-0358	1	TRANSISTOR NPN SI PD=310MW FT=60MHZ	28480	1854-0358
A16Q9	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A16Q10	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	24880	1853-0036
A16Q11	1853-0049		TRANSISTOR PNP SI CHIP PD=310MW	28480	1853-0049
A16Q12	1853-0084		TRANSISTOR PNP 2N4918 SI PD=30W FT=3MHZ	28480	1853-0084
A16R1	0757-0454		RESISTOR 33.2K 1% .125W F	24546	C4-1/8-T0-3322-F
A16R2	0699-0003	1	RESISTOR 8.2 10% .5W CC TC=0+412	01121	EB82G1
A16R3	0684-1241		RESISTOR 120K 10% .25W F C TC=–800/900	01121	CB1241
A16R4	0684-1031		RESISTOR 10K 10% .25W CC	01121	CB1031
A16R5	0698-3455		RESISTOR 261K 1% .125W F	16299	C4-1/8-T0-2613-F
A16R6	0698-4495		RESISTOR 37.4K 1% .125W F	24546	C4-1/8-T0-3742-F
A16R7	0684-1021		RESISTOR 1K 10% .25W CC	01121	CB1021
A16R8	0684-1041		RESISTOR 100K 10% .25W CC	01121	CB1041
A16R9	0757-0431		RESISTOR 2.43K 1% .125W F	24546	C4-1/8-T0-2431-F
A16R10	0811-1668	2	RESISTOR 1.5 5% 2W PW TC=0+–400	75042	BWH2-1R5-J
A16R11	0684-1231		RESISTOR 12K 10% .25W FC TC=–400/+800	01121	CB1231
A16R12	0684-1031		RESISTOR 10K 10% .25W CC	01121	CB1031
A16R13	0757-0450	1	RESISTOR 22.1K 1% .125W F TC=0+–100	24546	C4-1/8-T0-2212-F
A16R14	0698-5437	1	RESISTOR 12K .1% .125W F TC=0+–50	24546	NC55
A16R15	0684-1021		RESISTOR 1K 10% .25W CC	01121	CB1021
A16R16	0684-4731		RESISTOR 47K 10% .25W CC	01121	CB4731
A16R17			NOT ASSIGNED		
A16R18			NOT ASSIGNED		
A16R19			NOT ASSIGNED		
A16R20	2100-3253		RESISTOR-VAR TRMR 50K OHM 10% C TOP ADJ	73138	72PR50K
A16R21	0684-8231	1	RESISTOR 82K 10% .25W FC TC=–400/+800	01121	CB8231
A16R22	0687-4721	1	RESISTOR 4.7K 10% .5W CC TC=0+647	01121	EB4721
A16R23	0757-0428		RESISTOR 1.62K 1% .125W F TC=0+–100	24546	C4-1/8-T0-1621-F
A16R24	0811-1668		RESISTOR 1.5 5% 2W PW TC=0+–400	75042	BWH2-1R5-J
A16R25	0757-0433		RESISTOR 3.32K 1% .125W F TC=0+–100	24546	C4-1/8-T0-3321-F
A16R26	2100-0554		RESISTOR-VAR TRMR 500 OHM 10% C TOP ADJ	73138	72PR500
A16R27	0757-1093		RESISTOR 3K 1% .125W F TC=0+–100	24546	C4-1/8-T0-3001-F
A16R28	0698-3329		RESISTOR 10K .5% .125W F TC=0+–100	03888	PME55-1/8-T0-1002-D
A16R29	0698-5579	3	RESISTOR 5K .5% .125W F TC=0+–100	24546	C4-1/8-T0-5001-D
A16R30	0811-1666	1	RESISTOR 1 5% 2W PW TC=0+–800	75042	BWH2-1R0-J
A16R31	0684-3321		RESISTOR 3.3K 10% .25W CC	01121	CB3321
A16R32	0698-5579		RESISTOR 5K .5% .125W F TC=0+–100	24546	C4-1/8-T0-5001-D
A16R33	0698-5579		RESISTOR 5K .5% .125W F TC=0+–100	24546	C4-1/8-T0-5001-D
A16R34	0757-0431		RESISTOR 47K 10% .25W CC	01121	CB4731
A16R35	0811-1667	1	RESISTOR 1.2 5% 2W PW TC=0+–400	75042	BWH2-1R2-J
A16R36	0683-4715	2	RESISTOR 470 5% .25W FC TC=–400/+600	01121	CB4715
A16R37	0684-1011		RESISTOR 100 10% .25W CC	01121	CB1011
A16R38	0683-4715		RESISTOR 470 5% .25W FC TC=–400/+600	01121	CB4715
A16R39	0684-1011		RESISTOR 100 10% .25W CC	01121	CB1011
A16R40	0684-1041		RESISTOR 100K 10% .25W CC	01121	CB1041
A16R41	0757-0457		RESISTOR 47.5K 1% .125W F	24546	C4-1/8-T0-4752-F
A16R42	0684-1811		RESISTOR 180 10% .25W FC TC=–400/+600	01121	CB1811
A16R43	0757-0001		RESISTOR 13.3 1% .5W F TC=0+–100	19701	MFC-1/2-T0-13R3-F
A16S1	3101-0555	1	SWITCH-PB DPDT ALTNG 4A 250VAC	28480	3101-0555
A16S2	3101-1914	1	SWITCH-SL 2-DPDT-NS STD 1.5A 250VAC PC	28480	3101-1914
A16U1	1820-0196	3	IC RGLTR	07263	723HC
A16U2	1820-0196		IC RGLTR	07263	723HC
A16U3	1820-0196		IC RGLTR	07263	723HC
A16VR1	1902-3048	1	DIODE-ZNR 3.48V 5% D0-7 PD=.4W TC=–.058%	04713	SZ 10939-50
A16VR2	1902-0025		DIODE-ZNR 10V 5% D0-7 PD=.4W TC=+.06%	04713	SZ 10939-182
A16VR3	1902-3036		DIODE-ZNR 3.16V 5% .4W MAX PD	04713	SZ 10939-38
A16VR4	1902-3082		DIODE-ZNR 4.64V 5% .4W MAX PD	04713	SZ 10939-86
A16XU1	1200-0475		SOCKET	22526	75060-005
A16XU2	1200-0475		SOCKET	22526	75060-005
A16XU3	1200-0475		SOCKET	22526	75060-005

Table 6-3. List of Manufacturer Codes

MFR NO.	MANUFACTURER NAME	ADDRESS	ZIP CODE
00000	U.S.A. COMMON	ANY SUPPLIER OF USA	
00779	AMP INC	HARRISBURG PA	17105
0080A	ASSMAWN		
0086S	STETTNER-TRUSH INC	CAZENOVIA NY	13035
01121	ALLEN BRADLEY CO	MILWAUKEE WI	53212
01295	TEXAS INSTR INC SEMICOND CMPNT DIV	DALLAS TX	75231
02114	FERROXCUBE CORP	SAUGERTIES NY	12477
02735	RCA CORP SOLID STATE DIV	SOMMERVILLE NJ	08876
03888	PYROFILM CORP	WHIPPANY NJ	07981
04713	MOTOROLA SEMICONDUCTOR PRODUCTS	PHOENIX AZ	85008
06560	AIRCO SPEER ELEK DIV AIR RDCN CO	NOGALES AZ	85621
07263	FAIRCHILD SEMICONDUCTOR DIV	MOUNTAIN VIEW CA	94040
11236	CTS OF BERNE INC	BERNE IN	46711
12697	CLAROSTAT MFG CO INC	DOVER NH	03820
13103	THERMALLOY CO	DALLAS TX	75247
16299	CORNING GL WK ELEC CMPNT DIV	RALEIGH NC	27604
17856	SILICONIX INC	SANTA CLARA CA	95050
19701	MEPCO/ELECTRA CORP	MINERAL WELLS TX	76067
24226	GOWANDA ELECTRONICS CORP	GOWANDA NY	14070
24546	CORNING GLASS WORKS (BRADFORD)	BRADFORD PA	16701
27014	NATIONAL SEMICONDUCTOR CORP	SANTA CLARA CA	95051
27264	MOLEX PRODUCTS CO	DOWNERS GROVE IL	60515
28480	HEWLETT-PACKARD CO CORPORATE HQ	PALO ALTO CA	94304
30983	MEPCO/ELECTRA CORP	SAN DIEGO CA	92121
32997	BOURNS INC TRIMPOT PROD DIV	RIVERSIDE CA	92507
56289	SPRAGUE ELECTRIC CO	NORTH ADAMS MA	01247
57771	STIMPSON EDWIN B CO INC	BROOKLYN NY	11205
6F364	CENTRE ENGINEERING INC	STATE COLLEGE PA	16801
71400	BUSSMAN MFG DIV OF MCGRAW-EDISON CO	ST LOUIS MO	63017
71785	TRW ELEK COMPONENTS CINCH DIV	ELK GROVE VILLAGE IL	60007
72136	ELECTRO MOTIVE MFG CO INC	WILLIMANTIC CT	06226
72982	ERIE TECHNOLOGICAL PRODUCTS INC	ERIE PA	16512
73138	BECKMAN INSTRUMENTS INC HELIPOT DIV	FULLERTON CA	92634
74276	SIGNALITE INC	NEPTUNE NJ	07753
74970	JOHNSON E F CO	WASECA MN	56093
75042	TRW INC PHILADELPHIA DIV	PHILADELPHIA PA	19108
84411	TRW CAPACITOR DIV	OGALLALA NE	69153
9D949	AMPHENOL SALES DIV OF BUNKER-RAMO	HAZELWOOD MO	63042
91506	AUGAT INC	ATTLEBORO MA	02703
91637	DALE ELECTRONICS INC	COLUMBUS NE	68601
95121	QUALITY COMPONENTS INC	ST MARYS PA	15857

SECTION VII

MANUAL CHANGES

7-1. INTRODUCTION.

7-2. This section contains information required to backdate or update this manual for a specific instrument. Descriptions of special and standard options are also provided in this section.

7-3. MANUAL CHANGES.

7-4. This manual applies directly to instruments having the same serial prefix shown on the manual title page. If the serial prefix of your instrument is not the same as the one on the title page, find your serial prefix in table 7-1 and make all changes to the manual that are listed for that serial prefix. When making changes listed in table 7-1, make the change with the highest number first. For example, if backdating changes 1, 2, and 3 are required for your serial prefix, do change 3 first, then change 2, and finally change 1. If the serial prefix of your instrument is not listed either on the title page or in table 7-1, refer to the enclosed MANUAL CHANGES sheet for updating information. Also, if a MANUAL CHANGES sheet is supplied, make all indicated ERRATA corrections.

Table 7-1. Manual Changes

Serial Prefix	Make Changes
1522A	7-4, 2, 1
1526A	7-2
1533A	7-3
1541A	7-4
1551A	7-5
1612A	7, 6
1616A	7

CHANGE 1

Table 6-2,
- A7 Option 101: Change to HP Part No. 01740-66518; BOARD ASSY:HORIZONTAL SWEEP; Mfr Code 28480; Mfr Part No. 01740-66518.
- A7C39: Change to HP Part No. 0160-2198; CAPACITOR-FXD 20 PF +—5% 300 WVDC MICA; Mfr Code 28480; Mfr Part No. 0160-2198.
- Delete: A7C49.
- A7L3 and A7L7: Change to HP Part No. 9140-0105; COIL-FXD MOLDED RF CHOKE 8.2 UH 10%; Mfr Code 24226; Mfr Part No. 15/821.
- A7R155: Change to HP Part No. 0684-1021; RESISTOR 1K 10% .25W CC TUBULAR; Mfr Code 01121; Mfr Part No. CB1021.

Schematic 7,
- Delete: A7C49.

Figure 8-16,
- Replace component locator in figure 8-16 with figure 7-1.

Schematic 12,
- Move A7C39 from present position, and insert between base of A7Q30 and ground. Change value to 20 pF.
- Change A7L3 and A7L7 to 8.2 μH.
- Change A7R155 to 1K.

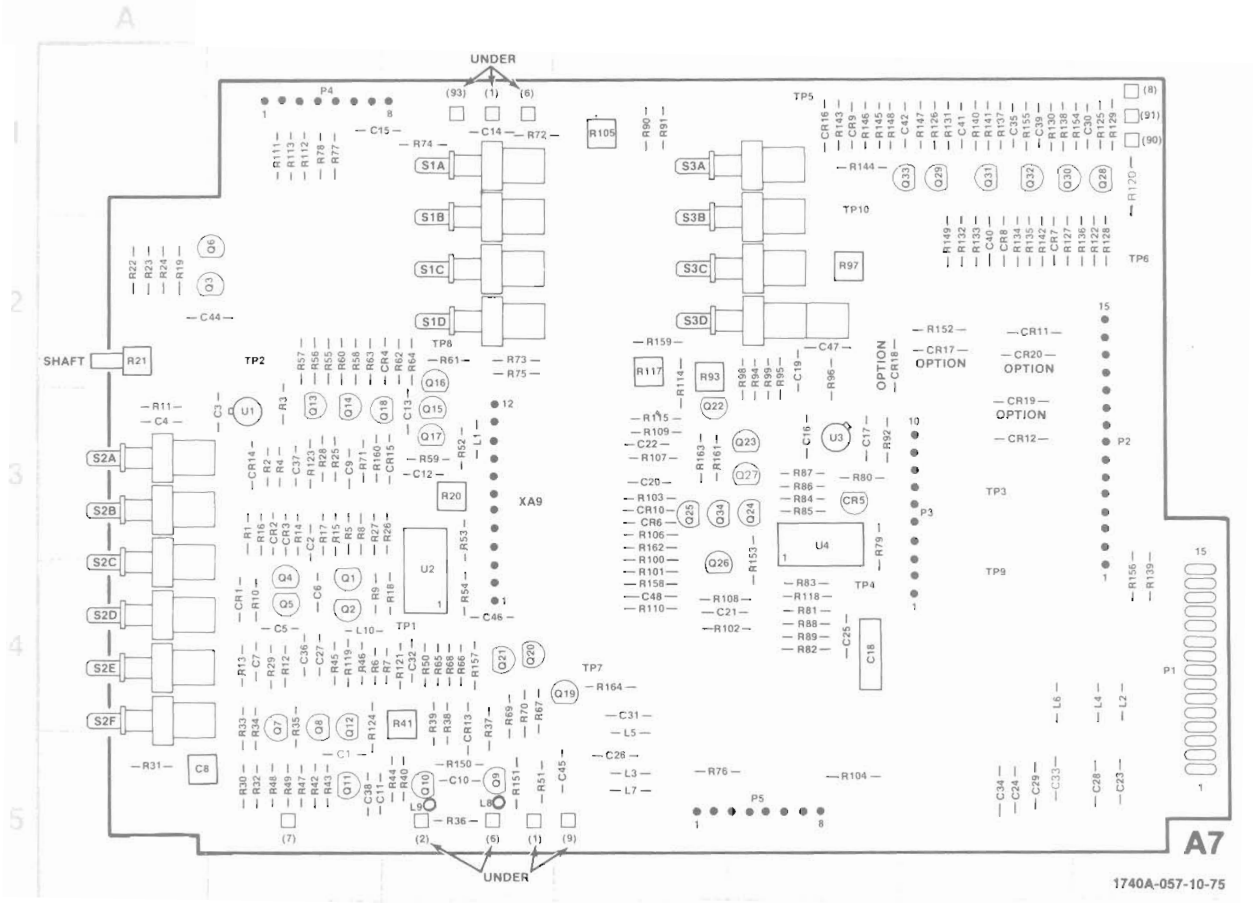
CHANGE 2

Paragraph 5-51k and 5-56h; tables 5-6, 5-8, and 5-9,
- Change A8R43 to A8C7.

Table 5-7 and 5-9,
- Change A9R28 to A9C5.

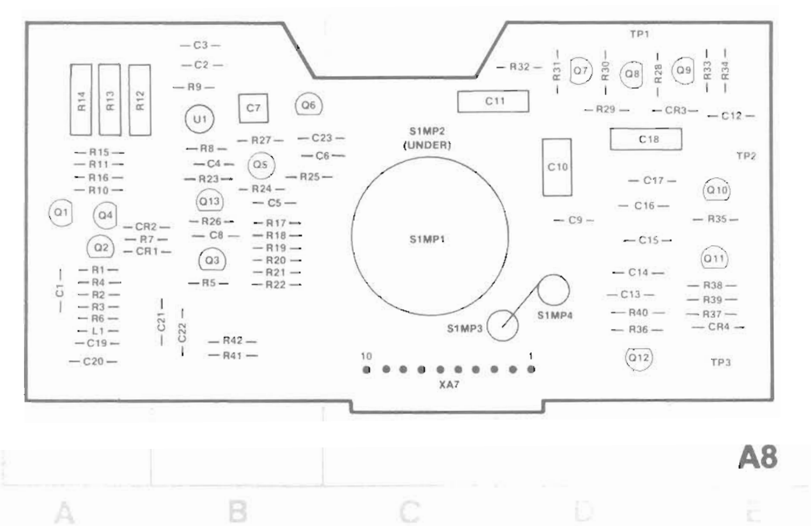
Figure 5-5,
- Change A8R43 to A8C7 and A9R28 to A9C5.

Table 6-2,
- Add: A3C79; HP Part No. 0150-0021; CAPACITOR-FXD .47 PF ±5% 500 WVDC TI DIOX; Mfr Code 95121, Mfr Part No. Type QC.
- A3R54 and A3R55: Change to HP Part No. 0757-0284; RESISTOR 150 1% .12 WF TUBULAR; Mfr Code 24546; Mfr Part No. C4-1/8-T0-151F.
- A8: Change to HP Part No. 01740-66510; BOARD ASSY, MAIN SWEEP; Mfr Code 28480; Mfr Part No. 01740-66510.
- A8C6: Change to HP Part No. 0160-3987; CAPACITOR-FXD 86 PF +—2% 500 WVDC MICA; Mfr Code 28480; Mfr Part No. 0160-3987.
- Add: A8C7; HP Part No. 0121-0434; CAPACITOR-V TRMR-AIR 2-19.3 PF 350 V; Mfr Code 74970; Mfr Part No. 189-0507-125.
- A8C13: Change to HP Part No. 0140-0149; CAPACITOR-FXD 470 PF +—5% 300 WVDC MICA; Mfr Code 72136; Mfr Part No. DM15F471J0300WV1CR.
- A8C14: Change to HP Part No. 0160-0157; CAPACITOR-FXD 4700 PF +—10% 200 WVDC POLYE; Mfr Code 56289; Mfr Part No. 292P47292.
- A8C15: Change to HP Part No. 0170-0040; CAPACITOR-FXD .047 UF +—10% 200 WVDC; Mfr Code 56289; Mfr Part No. 292P47392.
- A8C16: Change to HP Part No. 0180-0376; CAPACITOR-FXD .47 UF +—10% 35 VDC TA; Mfr Code 56289; Mfr Part No. 150D474X9035A2.
- A8C17: Change to HP Part No. 0180-0100; CAPACITOR-FXD 4.7 UF +—10% 35 VDC TA; Mfr Code 56289; Mfr Part No. 150D475X9035B2.
- A8C18: Change to HP Part No. 0180-0058; CAPACITOR-FXD 50 UF +—10% 25 VDC AL; Mfr Code 56289; Mfr Part No. 30D506G025CC2.


A
1
2
3
4
5
UNDER
(93)
(1)
(6)
P4
1
8
C15
R74
C14
R72
R105
R90
R91
TP5
R111
R113
R112
R78
R77
S1A
S1B
S1C
S1D
S3A
S3B
S3C
S3D
CR16
R143
CR9
R146
R145
R148
C42
R147
R126
R131
C41
R140
R141
R137
C35
R155
C39
R130
R138
R154
C30
R125
R129
(8)
(91)
(90)
R144
Q33
Q29
Q31
Q32
Q30
Q28
R120
TP10
R149
R132
R133
C40
CR8
R134
R135
R142
CR7
R127
R136
R122
R128
TP6
R97
R22
R23
R24
R19
Q6
Q3
C44
SHAFT
R21
TP2
R57
R56
R55
R60
R58
R63
CR4
R62
R64
TP8
R61
R73
R75
R159
C47
CR18
OPTION
R152
CR17
OPTION
CR11
CR20
OPTION
15
R117
R114
R93
R98
R94
R99
R95
C19
R96
R11
C4
C3
U1
R3
Q13
Q14
Q18
C13
Q16
Q15
12
R115
R109
Q22
CR19
OPTION
S2A
S2B
S2C
S2D
S2E
S2F
CR14
R2
R4
C37
R123
R28
R25
C9
R71
R160
CR15
Q17
R52
L1
C22
R107
R163
R161
Q23
C16
U3
C17
R92
10
CR12
P2
R59
C12
C20
Q27
R87
R86
R84
R85
R80
CR5
R20
XA9
R103
CR10
CR6
R106
R162
R100
R101
R158
C48
R110
Q25
Q34
Q24
P3
TP3
R1
R16
CR2
CR3
R14
C2
R17
R15
R5
R8
R27
R26
U2
R53
U4
R79
R153
Q26
1
15
TP9
CR1
R10
Q4
Q5
C6
Q1
Q2
R9
R18
R54
1
C46
R83
R118
R81
R88
R89
R82
R108
C21
R102
TP4
1
1
R156
R139
C5
L10
TP1
C25
C18
R13
C7
R29
R12
C36
C27
R45
R119
R46
R6
R7
R121
C32
R50
R65
R68
R66
R157
Q21
Q20
TP7
R164
Q19
P1
R33
R34
Q7
R35
Q8
Q12
R124
R41
R39
R38
CR13
R37
R69
R70
R67
C31
L5
L6
L4
L2
R31
C8
C1
R150
C26
C10
L3
R76
R104
R30
R32
R48
R49
R47
R42
R43
Q11
C38
C11
R44
R40
Q10
Q9
R151
R51
C45
L7
L9
L8
C34
C24
C29
C33
C28
C23
P5
1
8
1
(7)
R36
(2)
(6)
(1)
(9)
UNDER
A7
1740A-057-10-75

REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC
C1	B-5	C40	F-2	P2	G-3	R2	B-3	R40	C-5	R78	B-1	R117	D-2	R155	F-1
C2	B-3	C41	F-1	P3	F-3	R3	B-3	R41	C-4	R79	E-3	R118	E-4	R156	G-4
C3	B-3	C42	F-1	P4	B-1	R4	B-3	R42	B-5	R80	E-3	R119	B-4	R157	C-4
C4	A-3	C44	B-2	P5	E-5	R5	B-3	R43	B-5	R81	E-4	R120	G-1	R158	D-4
C5	B-4	C45	D-5	Q1	B-4	R6	C-4	R44	C-5	R82	E-4	R121	C-4	R159	D-2
C6	B-4	C46	C-4	Q2	B-4	R7	C-4	R45	B-4	R83	E-4	R122	G-2	R160	B-3
C7	B-4	C47	E-2	Q3	B-2	R8	B-3	R46	B-4	R84	E-3	R123	B-3	R161	D-3
C8	A-1	C48	D-4	Q4	B-4	R9	C-4	R47	B-5	R85	E-3	R124	B-4	R162	D-3
C9	B-3	CR1	B-4	Q5	B-4	R10	B-4	R48	B-5	R86	E-3	R125	G-1	R163	D-3
C10	C-5	CR2	B-3	Q6	B-2	R11	A-3	R49	B-5	R87	E-3	R126	F-1	R164	D-4
C11	B-5	CR3	B-3	Q7	B-4	R12	B-4	R50	C-4	R88	E-4	R127	F-2	S1A	C-1
C12	C-3	CR4	C-2	Q8	B-4	R13	B-4	R51	C-5	R89	E-4	R128	G-2	S1B	C-2
C13	C-3	CR5	E-3	Q9	C-5	R14	B-3	R52	C-3	R90	D-1	R129	G-1	S1C	C-2
C14	C-1	CR6	D-3	Q10	C-5	R15	B-3	R53	C-3	R91	D-1	R130	F-1	S1D	C-2
C15	C-1	CR7	F-2	Q11	B-5	R16	B-3	R54	C-4	R92	E-3	R131	F-1	S2A	A-3
C16	E-3	CR8	F-2	Q12	B-4	R17	B-3	R55	B-2	R93	D-2	R132	F-2	S2B	A-3
C17	E-3	CR9	E-1	Q13	B-3	R18	C-4	R56	B-2	R94	E-2	R133	F-2	S2C	A-4
C18	E-4	CR10	D-3	Q14	B-3	R19	A-2	R57	B-2	R95	E-2	R134	F-2	S2D	A-4
C19	E-2	CR11	F-2	Q15	C-3	R20	C-3	R58	B-2	R96	E-2	R135	F-2	S2E	A-4
C20	D-3	CR12	F-3	Q16	C-2	R21	A-2	R59	C-3	R97	E-2	R136	G-2	S2F	A-4
C21	D-4	CR13	C-4	Q17	C-3	R22	A-2	R60	B-2	R98	E-2	R137	F-1	S3A	D-1
C22	D-3	CR14	B-3	Q18	C-3	R23	A-2	R61	C-2	R99	E-2	R138	F-1	S3B	D-2
C23	G-5	CR15	C-3	Q19	D-4	R24	A-2	R62	C-2	R100	D-4	R139	G-4	S3C	D-2
C24	F-5	CR16	E-1	Q20	C-4	R25	B-3	R63	B-2	R101	D-4	R140	F-1	S3D	D-2
C25	E-4	CR17	F-2	Q21	C-4	R26	C-3	R64	C-2	R102	D-4	R141	F-1	TP1	C-4
C26	D-5	CR18	E-2	Q22	D-3	R27	C-3	R65	C-4	R103	D-3	R142	F-2	TP2	B-2
C27	B-4	CR19	F-3	Q23	E-3	R28	B-3	R66	C-4	R104	E-5	R143	E-1	TP3	F-3
C28	G-5	CR20	F-2	Q24	E-3	R29	B-4	R67	C-4	R105	D-1	R144	E-1	TP4	E-4
C29	F-5	L1	C-3	Q25	D-3	R30	B-5	R68	C-4	R106	D-3	R145	E-1	TP5	E-1
C30	G-1	L2	G-4	Q26	D-4	R31	A-5	R69	C-4	R107	D-3	R146	E-1	TP7	D-4
C31	D-4	L3	D-5	Q27	E-3	R32	B-5	R70	C-4	R108	D-4	R147	F-1	TP8	C-2
C32	C-4	L4	G-4	Q28	G-1	R33	B-4	R71	B-3	R109	D-3	R148	E-1	TP9	F-4
C33	F-5	L5	D-5	Q29	F-1	R34	B-4	R72	C-1	R110	D-4	R149	F-2	TP10	E-1
C34	F-5	L6	F-4	Q30	F-1	R35	B-4	R73	D-2	R111	B-1	R150	C-5	U1	B-3
C35	F-1	L7	D-5	Q31	F-1	R36	C-5	R74	C-1	R112	B-1	R151	C-5	U2	C-4
C36	B-4	L8	C-5	Q32	F-1	R37	C-4	R75	D-2	R113	B-1	R152	F-2	U3	E-3
C37	B-3	L9	C-5	Q33	F-1	R38	C-4	R76	D-5	R114	D-2	R153	E-4	U4	E-3
C38	B-5	L10	B-4	Q34	D-3	R39	C-4	R77	B-1	R115	D-3	R154	G-1	XA9	C-3
C39	F-1	P1	G-4	R1	B-3										

Figure 7-1. Replacement for Component Locator in Figure 8-16


TP1
— C3 —
— C2 —
— R9 —
R14
R13
R12
U1
C7
Q6
— R32 —
R31
Q7
R30
Q8
R28
Q9
R33
R34
C11
— R29 —
— CR3 —
— C12 —
— R15 —
— R11 —
— R16 —
— R10 —
— R8 —
— C4 —
Q5
— R23 —
— R27 —
— C23 —
— C6 —
— R25 —
— R24 —
Q13
— C5 —
S1MP2
(UNDER)
C10
C18
TP2
— C17 —
Q10
— C16 —
— R35 —
Q1
Q4
— CR2 —
— R7 —
— CR1 —
Q2
— R26 —
— C8 —
— R17 —
— R18 —
— R19 —
— R20 —
— R21 —
— R22 —
Q3
— R5 —
S1MP1
— C9 —
— C15 —
Q11
— R1 —
— R4 —
— R2 —
— R3 —
— R6 —
— L1 —
— C19 —
— C20 —
C1
C21
C22
— R42 —
— R41 —
S1MP3
S1MP4
— C14 —
— C13 —
— R40 —
— R36 —
— R38 —
— R39 —
— R37 —
— CR4 —
10
1
XA7
Q12
TP3
A
B
C
D
E
A8

REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC
C1	A-2	Q3	B-2	R21	B-2
C2	B-1	Q4	A-2	R22	B-2
C3	B-1	Q5	B-2	R23	B-2
C4	B-2	Q6	B-1	R24	B-2
C5	B-2	Q7	D-1	R25	B-2
C6	B-2	Q8	D-1	R26	B-2
C7	B-1	Q9	E-1	R27	B-1
C8	B-2	Q10	E-2	R28	D-1
C9	D-2	Q11	E-2	R29	D-1
C10	D-2	Q12	D-3	R30	D-1
C11	C-1	Q13	B-2	R31	D-1
C12	E-1	R1	A-2	R32	D-1
C13	D-2	R2	A-2	R33	E-1
C14	D-2	R3	A-2	R34	E-1
C15	D-2	R4	A-2	R35	E-2
C16	D-2	R5	B-2	R36	D-3
C17	D-2	R6	A-3	R37	E-2
C18	D-2	R7	A-2	R38	E-2
C19	A-3	R8	B-2	R39	E-2
C20	A-3	R9	B-1	R40	D-2
C21	B-3	R10	A-2	R41	B-3
C22	B-3	R11	A-2	R42	B-3
C23	B-2	R12	A-1	S1MP1	C-2
CR1	A-2	R13	A-1	S1MP2	C-2
CR2	A-2	R14	A-1	S1MP3	D-3
CR3	E-1	R15	A-2	S1MP4	D-2
CR4	E-3	R16	A-2	TP1	D-1
L1	A-3	R17	B-2	TP2	E-2
Q1	A-2	R18	B-2	TP3	E-3
Q2	A-2	R19	B-2	U1	B-1
		R20	B-2	XA7	C-2

1740A-059-10-75

Figure 7-2. Replacement for Component Locator in Figure 8-17

A8R7: Change to HP Part No. 0757-0429; RESISTOR 1.82K 1% .125 WF; Mfr Code 24546; Mfr Part No. C4-1/8-T0-1821-F.

Add: A8R10 and A8R11; HP Part No. 0757-0431; RESISTOR 2.43K 1% .12 WF; Mfr Code 24546; Mfr Part No. C4-1/8-T0-2431-F.

A8R25: Change to HP Part No. 0684-6801; RESISTOR 68 ohm 10% .25 WF; Mfr Code 01121; Mfr Part No. CB5801.

Delete: A8R43.

A9: Change to HP Part No. 01740-66509; BOARD ASSY, DELAYED SWEEP; Mfr Code 28480; Mfr Part No. 01740-66509.

A9C4: Change to HP Part No. 0140-0193; CAPACITOR-FXD 82 PF +—5% 300 WVDC MICA; Mfr Code 72136; Mfr Part No. DM15E820J0300WV1CR.

Add: A9C5; HP Part No. 0121-0434; CAPACITOR-V TRMR-AIR 2-19.3 PF 350 V; Mfr Code 74970; Mfr Part No. 189-0507-125.

Add: A9R8 and A9R9; HP Part No. 0757-0431; RESISTOR 2.43K 1% .12 WF; Mfr Code 24546; Mfr Part No. C4-1/8-T0-2431-F.

Delete: A9R28.

Figure 8-13, Component Locator,

Add: A3C79 between A3R54 and A3R55.

Schematic 4,

Add: A3C79 between point $\bigtriangledown$B and junction of A3C11 and A3L3.

Change: A3R54 and A3R55 to 150 ohms.

Figure 8-17,

Replace component locator in figure 8-17 with figure 7-2.

Schematic 8,

Change: A8C6 to 86 PF.

Add: A8C7 2.0 - 19.3 PF capacitor, .05 - 2 μSEC, in parallel with A8C6.

Change: A8C13 to 470 PF.

Change: A8C14 to 4700 PF.

Change: A8C15 to 0.047 UF.

Change: A8C16 to 0.47 UF.

Change: A8C17 to 4.7 UF.

Change: A8C18 to 50 UF.

Change: A8R7 to 1.82K.

Add: A8R10 2.43K in series with A8R11 2.43K to replace A8R43. The junction of A8R10 and A8R11 is connected to the same contact on A8S1 as the wiper of A8R43.

Change: A8R25 to 68 ohms.

Figure 8-19,

Replace component locator in figure 8-19 with figure 7-3.

Schematic 10,

Change: A9C4 to 82 PF.

Add: A9C5 2.0 - 19.3 PF capacitor, .05 - 2 μSEC, in parallel with A9C4.

Add: A9R8 2.43K in series with A9R9 2.43K to replace A9R28. The junction of A9R8 and A9R9 is connected to the same contact on A8S1 as the wiper of A9R28.

CHANGE 3

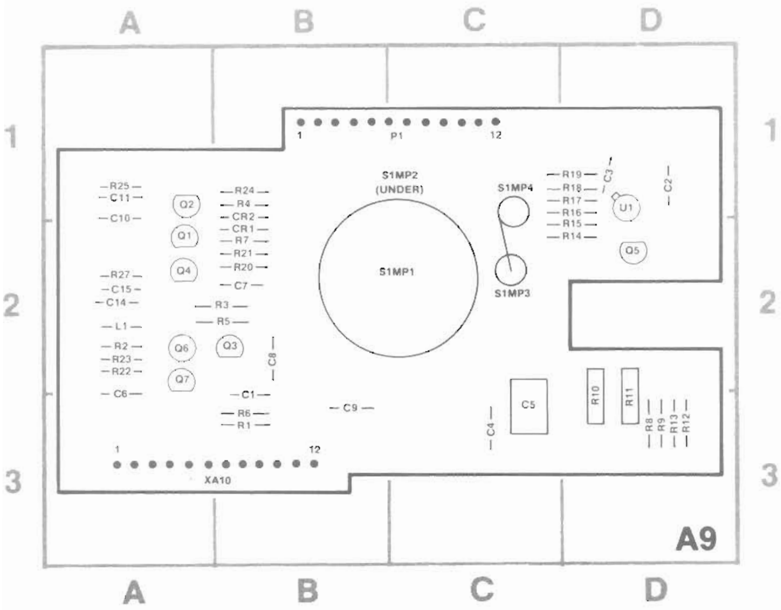
Table 6-2,

A7: Change to HP Part No. 01740-66519; BOARD ASSY:HORIZONTAL SWEEP; Mfr Code 28480; Mfr Part No. 01740-66519.

A7 Option 101: Change to HP Part No. 01740-66520; BOARD ASSY:HORIZONTAL SWEEP; Mfr Code 28480; Mfr Part No. 01740-66520.

Add: A7CR14; HP Part No. 1901-0376; DIODE-GEN PRP 35 V MAX VRM 50 MA; Mfr Code 28480; Mfr Part No. 1901-0376.

Delete: A7CR21, A7CR22, A7CR23, A7R165, A7R166, A7R167, and A7R168.



REF DESIG	GRID LOC	REF DESIG	GRID LOC
C1	B-2	R5	B-2
C2	D-1	R6	B-3
C3	D-1	R7	B-2
C4	C-3	R8	D-3
C5	C-3	R9	D-3
C6	A-3	R10	D-3
C7	B-2	R11	D-3
C8	B-2	R12	D-3
C9	B-3	R13	D-3
C10	A-1	R14	D-3
C11	A-1	R15	D-3
C14	A-2	R16	D-1
C15	A-2	R17	D-1
CR1	B-2	R18	D-1
CR2	B-1	R19	D-1
L1	A-2	R20	B-2
P1	C-1	R21	B-2
Q1	A-2	R22	A-2
Q2	A-1	R23	A-2
Q3	B-2	R24	B-1
Q4	A-2	R25	A-1
Q5	D-2	R27	A-2
Q6	A-2	S1MP1	C-2
Q7	A-2	S1MP2	C-1
R1	B-3	S1MP3	C-2
R2	A-2	S1MP4	C-1
R3	B-2	U1	D-1
R4	B-1	XA10	B-3

1740A-058-10-75

Figure 7-3. Replacement for Component Locator in Figure 8-19

A7P4: Change to HP Part No. 1251-3071; CONNECTOR 8-PIN POST TYPE; Mfr Code 27264; Mfr Part No. 09-56-1081 (2183-8A).

A7R65, A7R66, and A7R68: Change to HP Part No. 0684-4711; RESISTOR 470 ohms 10% .25 W CC; Mfr Code 01121; Mfr Part No. CB4711.

A7R74: Change to HP Part No. 0684-8221; RESISTOR 8.2K 10% .25W CC; Mfr Code 01121; Mfr Part No. CB8221.

A7R97: Change to HP Part No. 2100-1788; RESISTOR-TRMR 500 10% C TOP-ADJ 1-TURN; Mfr Code 30983; Mfr Part No. ET50W501.

Schematic 7,

Add: A7CR14 between pins 3 and 4 of A7U1 (cathode to pin 3).

Delete: A7CR21, A7CR22, and A7CR23.

Delete: Pin 1 on A7P4, Change pin 2 to pin 1, and show cathode of DS4 to chassis ground through (0) wire.

Change: A7R74 to 8.2K.

Delete: A7R97, A7R165, A7R166, A7R167, and A7R168.

Figure 8-16,

Replace component locator in figure 8-16 with figure 7-1, and add A7C49 between A7R53 and A7XA9. Add following note to figure 7-1: "Option 101: BOARD NUMBER CHANGES TO 01740-66520 AND CR17-20 ARE ADDED." Change board number from 66518 to 66519.

Schematic 9,

Change: Pin 7 to 6, pin 8 to 7, and pin 9 to 8 on A7P4.

Schematic 11,

Add: A7R97 500 ohm variable resistor, A VS B CAL, between A7C47 and A7R98.

Change: Pin 6 to 5, pin 5 to 4, pin 4 to 3, and pin 3 to 2 on A7P4.

CHANGE 4

Table 6-2,

A11C13: Change to HP Part No. 0150-0048, CAPACITOR-FXD .22 PF +—5% 500WVDC TI DIOX, Mfr Code 95121, Mfr Part No. Type QC.

Delete: A11C14.

A11R6: Change to HP Part No. 0683-0395,RESISTOR 3.9 5% .25W CC, Mfr Code 01121, Mfr Part No. CB39G5.

A11R11: Change to HP Part No. 0757-0457, RESISTOR 47.5K 1% .125WF TC=0+—100, Mfr Code 24546, Mfr Part No. C4-1/8-T0-4752-F.

A11R17: Change to HP Part No. 0757-0457, RESISTOR 47.5K 1% .125WF TC=0+—100, Mfr Code 24546, Mfr Part No. C4-1/8-T0-4752-F.

A11R20: Change to HP Part No. 0683-0395, RESISTOR 3.9 5% .25W FC TC=—400/+500, Mfr Code 01121, Mfr Part No. CB39G5.

Schematic 11,

A11C13: Change value to 0.22 PF.

Delete: A11C14.

A11R6: Change value to 3.9 ohms.

A11R20: Change value to 3.9 ohms.

CHANGE 5

Table 6-2,

A5MP1: Change HP Part No. and Mfr Part No. to 01740-20504.

CHANGE 6

Table 6-2,

W8: Change HP Part No. and Mfr Part No. to 01740-61612.

A16: Change HP Part No. and Mfr Part No. to 01740-66501.
Delete: A16C20, A16Q11, and A16Q12.
Add: A16R17, HP Part No. 0684-1021, RESISTOR 1K 10% .25W CC, Mfr Code 01121, Mfr Part No. CB1021.
Add: A16R18, HP Part No. 0684-1021, RESISTOR 1K 10% .25W CC, Mfr Code 01121, Mfr Part No. CB1021.
Add: A16R19, HP Part No. 0764-0033, RESISTOR 33 5% 2W MO TC=0+—200, Mfr Code 24546, Mfr Part No. FP42-Z-T00-3302-J.
Delete: A16R41, A16R42, A16R43, A16VR3, and A16VR4.

Figure 8-10,
Replace figure 8-10 with figure 7-4.

Schematic 1,
Make changes shown in figure 7-5.

CHANGE 7

Paragraph 2-9,
Replace existing paragraph with the following paragraph and delete figure 2-2.

2-9. The instrument is normally set at the factory for 120-volt operation. To operate the instrument from any other ac power source, proceed as follows:

a. Verify that Model 1740A power cable is not connected to any input power source.

b. Remove bottom cover from the Model 1740A.

c. On Low-voltage Power Supply A16, set Line Selector Switch A16S2, to required positions for input ac power source.

d. For 220-V inputs, replace fuse A16F1 with 0.5 A slow-blow fuse supplied with instrument.

e. Replace bottom cover.

f. Connect Model 1740A input power cable to input power source.

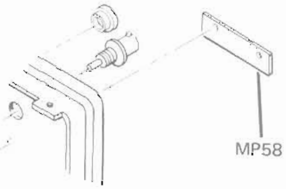
g. After changing the line voltage selection switch setting, remove Line-voltage Plate if applicable and reinstall it so proper line voltage is visible.

Figure 3-1,
Replace rear-panel photo with figure 7-6 and delete item 66, FUSE.

Table 6-2,
Delete F1, HP Part No. 2110-0007, and F1, HP Part No. 2110-0202.
MP44: Change HP Part No. and Mfr Part No. to 01740-00204.
MP56: Change HP Part No. and Mfr Part No. to 01740-04103.
MP57: Change HP Part No. and Mfr Part No. to 01740-04104.
MP60: Change HP Part No. and Mfr Part No. to 01740-20502.
Delete: A7CR24 and A7R169.
A7R78: Change to HP Part No. 0757-0439, RESISTOR 6.81K 1% .125WF, Mfr Code 24546, Mfr Part No. C4-1/8-T0-6811-F.
Add: A16E1, HP Part No. 2110-0269, FUSE HOLDER, CLIP TYPE .25 FUSE, Mfr Code 91506, Mfr Part No. 6008-32CN.
Add: A16F1, HP Part No. 2110-0007, FUSE 1A 250 V SLO-BLO 1.25 x .25 UL, Mfr Code 71400, Mfr Part No. MDL-1.
Add: A16F1, HP Part No. 2110-0202, FUSE .5A 250 V SLO-BLO 1.25 x .25 UL, Mfr Code 71400, Mfr Part No. MDL-1/2.

Figure 5-5,
Delete adjustment A7R169, DELAY START.

Figure 6-1,
Delete: F1 and XF1.
Add: MP58 as shown below.



Schematic 1,
Change line input as shown below.

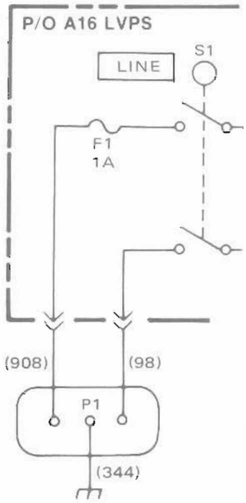
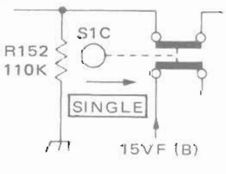
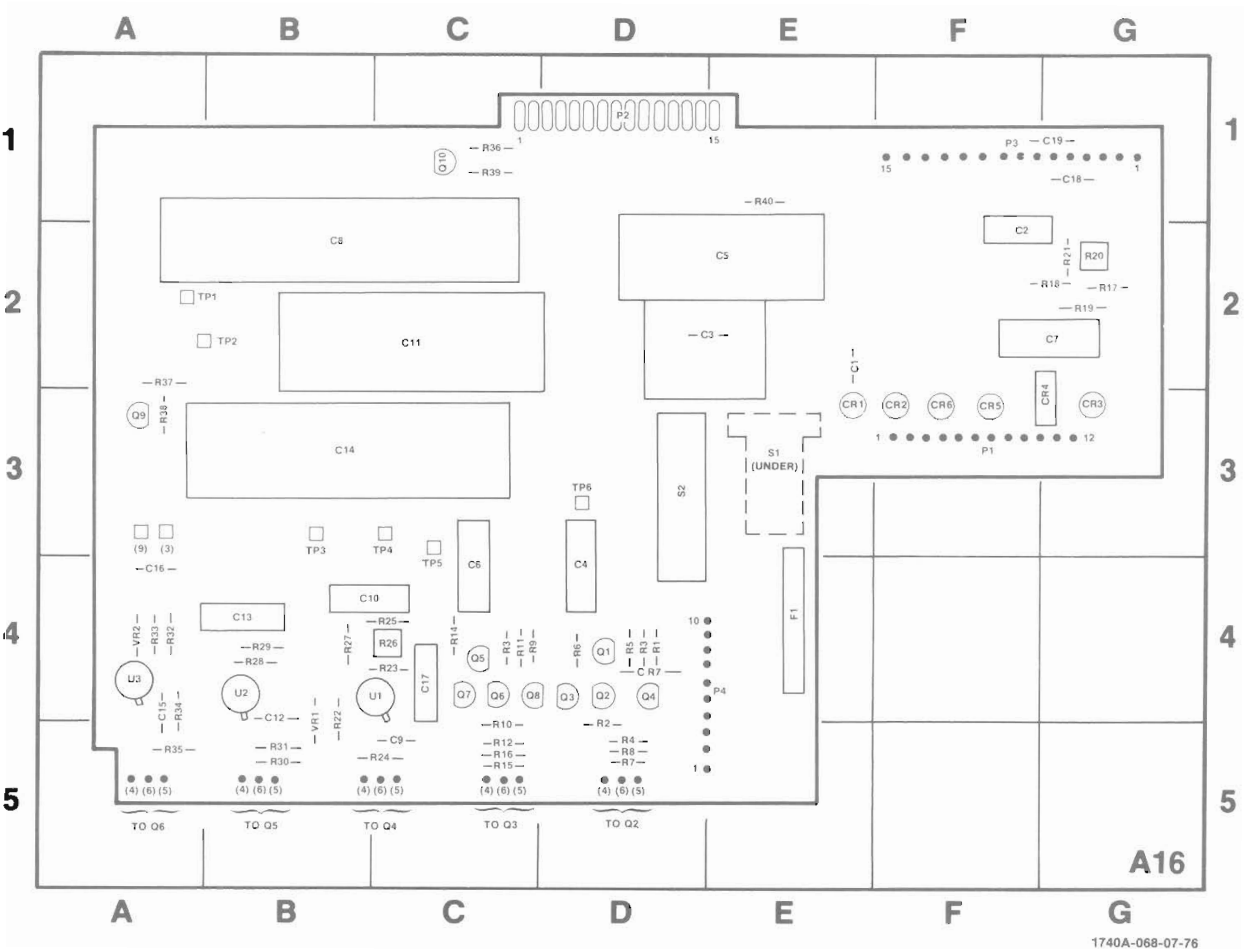


Figure 8-10,
Add A16F1 (location E-4) directly below A16S1.

Schematic 7,
Delete A7CR24 and change SINGLE switch wiring as shown below.



Schematic 9,
Delete: A7R169.
Change A7R78 to 6810 ohms and show connection to ground.


A
B
C
D
E
F
G
1
2
3
4
5
P2
1
15
Q10
R36
R39
P3
C19
C18
R40
C8
C5
C2
R21
R20
R18
R17
R19
TP1
TP2
C11
C3
C7
C1
CR1
CR2
CR6
CR5
CR4
CR3
P1
12
R37
Q9
R38
C14
S1
(UNDER)
S2
TP6
(9)
(3)
TP3
TP4
TP5
C6
C4
C16
C10
C13
R25
R26
R27
R14
R3
R11
R9
R6
Q1
R5
R1
C R7
VR2
R33
R32
R29
R28
R23
C17
Q5
U3
U2
U1
Q7
Q6
Q8
Q3
Q2
Q4
P4
F1
10
C15
R34
C12
VR1
R22
C9
R10
R2
R35
R31
R30
R24
R12
R16
R15
R4
R8
(4) (6) (5)
TO Q6
TO Q5
TO Q4
TO Q3
TO Q2
A16
1740A-068-07-76

REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC
C1	E-2	C15	A-4	P1	F-3	Q10	C-1	R13	C-4	R26	C-4	R40	C-1
C2	F-2	C16	A-4	P2	D-1	R1	D-4	R14	C-4	R27	C-4	S1	E-3
C3	E-2	C17	C-4	P3	F-1	R2	D-4	R15	C-5	R28	B-4	S2	D-3
C4	D-3	C18	G-1	P4	E-4	R3	D-4	R16	C-5	R29	B-4	TP1	A-2
C5	E-2	C19	G-1	Q1	D-4	R4	D-5	R17	G-2	R30	B-5	TP2	B-2
C6	C-3	CR1	E-3	Q2	D-4	R5	D-4	R18	G-2	R31	B-5	TP3	B-3
C7	G-2	CR2	F-3	Q3	D-4	R6	D-4	R19	G-2	R32	A-4	TP4	C-3
C8	B-2	CR3	G-3	Q4	D-4	R7	D-5	R20	G-2	R33	A-4	TP5	C-3
C9	C-5	CR4	G-3	Q5	C-4	R8	D-5	R21	G-2	R34	A-4	TP6	D-3
C10	C-4	CR5	F-3	Q6	C-4	R9	D-4	R22	B-5	R35	A-5	U1	C-4
C11	C-2	CR6	F-3	Q7	C-4	R10	C-5	R23	C-4	R36	C-1	U2	B-4
C12	B-4	CR7	D-4	Q8	D-4	R11	C-4	R24	C-5	R37	A-2	U3	A-4
C13	B-4	F1	E-4	Q9	A-3	R12	C-5	R25	C-4	R38	A-3	VR1	B-5
C14	B-3											VR2	A-4

Figure 7-4. Replacement for Component Locator in Figure 8-10

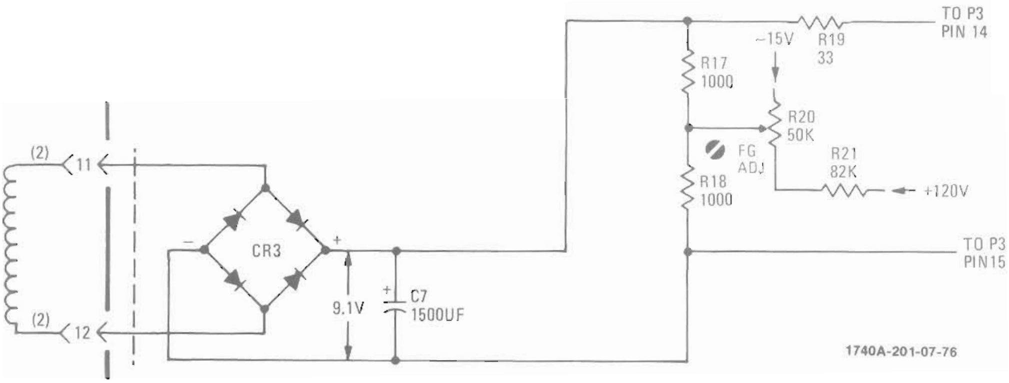

TO P3
PIN 14
~15V
R19
33
R17
1000
R20
50K
FG
ADJ
R21
82K
+120V
R18
1000
(2)
11
(2)
12
CR3
−
+
9.1V
C7
1500UF
TO P3
PIN15
1740A-201-07-76

Figure 7-5. Changes to Schematic 1

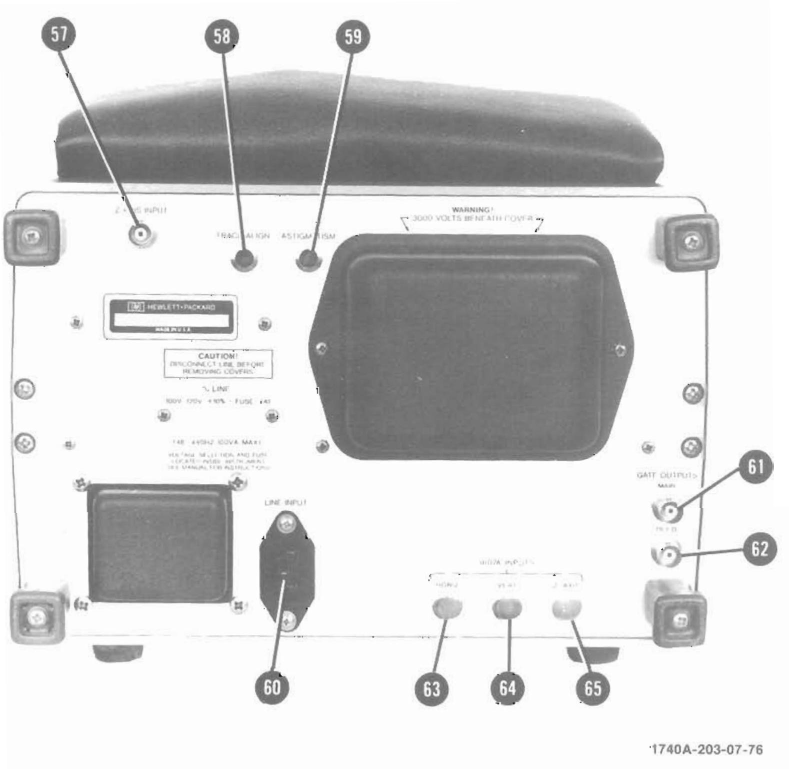

57
58
59
WARNING!
3000 VOLTS BENEATH COVER
HEWLETT·PACKARD
CAUTION!
DISCONNECT LINE BEFORE
REMOVING COVERS
LINE INPUT
GATE OUTPUTS
MAIN
61
62
60
63
64
65
1740A-203-07-76

Figure 7-6. Rear-panel Changes

SECTION VIII

SCHEMATICS AND TROUBLESHOOTING

8-1. INTRODUCTION.

8-2. This section contains schematics, troubleshooting data, repair information, and component-identification illustrations. An interconnection diagram is also provided.

8-3. PREVENTIVE MAINTENANCE.

8-4. CLEANING. Painted surfaces can be cleaned with a commercial, spray-type window cleaner or with a mild soap and water solution.

CAUTION

> Avoid the use of chemical cleaning agents which might damage the plastics used in this instrument. Recommended cleaning agents are isopropyl alcohol, kelite (1 part kelite, 20 parts water), or a solution of 1% mild detergent and 99% water.

8-5. Corroded spots are best removed with soap and water. Stubborn residues can be removed with a fine abrasive. Protect such areas from further corrosion with an application of silicone resin such as GE DRI-FILM 88.

8-6. SWITCH MAINTENANCE. The pushbutton switches in this instrument were designed for long, trouble-free service. If one of these switches should become defective, replacement rather than repair is recommended.

8-7. Rotary switches can easily be serviced after removal from the instrument. For example, to remove the TIME/DIV switch, the TIME/DIV switch shaft must also be removed. Refer to the paragraphs on repair in this section for disassembly instructions.

8-8. Conventional rotary switches are serviced by cleaning the contacts with a degreaser such as M-180 FREON TF DEGREASER. Contact surfaces should be lubricated with a lubricant comparable to LUBRIPLATE FML produced by the Fiske Brothers Refining Company. LUBRIPLATE FML is available from the Hewlett-Packard Company (HP Part No. 6040-0305).

8-9. To service the rotary switches on assemblies A8 and A9, proceed as follows:

a. Remove TIME/DIV knob and shaft (refer to paragraph 8-24).

b. Remove plug-in assembly (A8 or A9) from assembly A7.

c. Note orientation of slot in rotor section of switch.

d. Remove metal retainer ring from rotor switch and separate two sections.

e. Check contact area on etched circuit board. If contact area shows excessive wear, replace circuit board.

f. Check contact on both rotor sections. If contacts show excessive wear, replace rotor section.

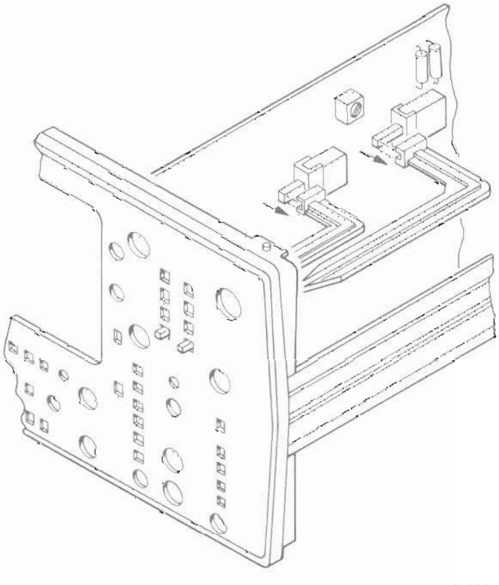
g. Clean and lubricate contacts on etched circuit board and rotors as described in paragraph 8-8.

h. Place rotor sections on etched circuit board and reinstall retainer ring.

i. Position slotted portion of open rotor section as noted in step c.

j. Reinstall assembly in instrument.

k. Reinstall TIME/DIV shaft and knob assembly.



1740A-060-10-75

Figure 8-1. Switch Extender Shaft Removal

8-10. Switches in the vertical attenuators require no lubrication, cleaning, or maintenance.

8-11. To remove the horizontal right-angle switch extender shafts, depress the switch connected to the extender shaft to be removed. While supporting switch shaft with finger, gently pull extender shaft away from circuit board (90° from the switch axis). To reinstall, reverse removal procedure (see figure 8-1).

8-12. REMOVAL AND REPLACEMENT.

8-13. Instructions for removing major assemblies are contained in the following paragraphs. Instructions for repairing circuit board assemblies are provided in paragraph 8-28. A replaceable parts list is provided in Section VI.

8-14. CRT REMOVAL AND REPLACEMENT. To remove and replace the CRT, see figures 6-1 and 8-2, and proceed as follows:

WARNING

To prevent personal injury, wear a face mask or goggles when handling the CRT. Wear protective gloves and handle the CRT carefully.

a. Disconnect line cord and remove top and bottom covers from instrument.

b. Disconnect the post-accelerator lead and immediately discharge lead to ground.

WARNING

Failure to discharge high voltage can result in severe electrical shock to personnel and damage to the instrument.

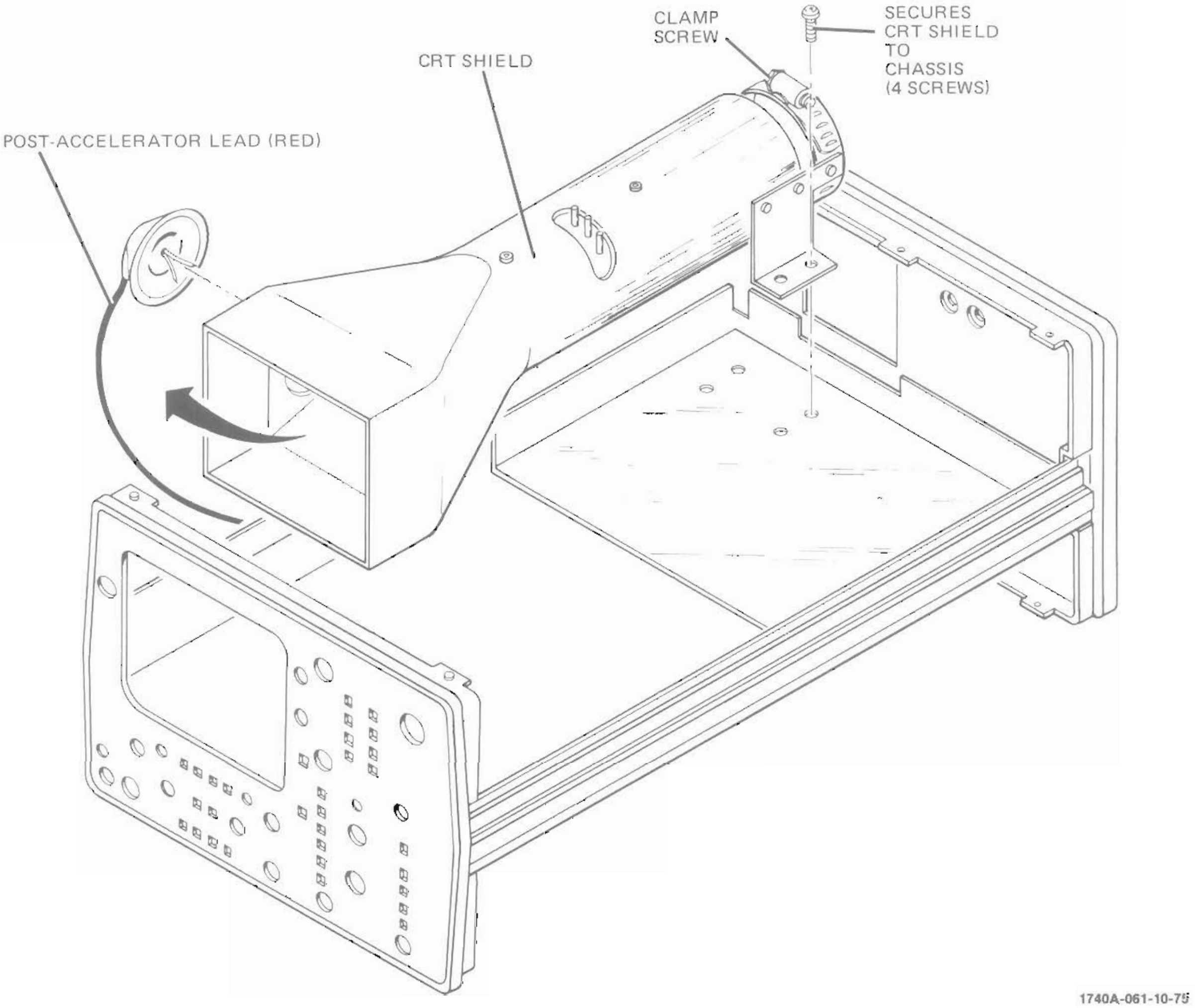

CLAMP SCREW
SECURES CRT SHIELD TO CHASSIS (4 SCREWS)
CRT SHIELD
POST-ACCELERATOR LEAD (RED)
1740A-061-10-75

Figure 8-2. CRT Removal

c. Remove rear-panel CRT socket cover (MP33); then disconnect socket.

d. Remove HVPS cover (MP54).

e. Disconnect (956) and (957) wires from rear of HV Power Supply Assembly A15.

f. Disconnect all neck-pin leads.

g. Disconnect seven CRT cable wires from top of gate amplifier A12, and lay this cable to outside of instrument.

h. Remove four screws (two per side) that secure rear of CRT shield (MP65) to chassis.

i. Gently move CRT and shield about two inches toward rear of instrument.

j. Tilt shield up and gently lift CRT and shield out of the instrument.

k. Loosen clamp screw at rear of shield and remove CRT from shield.

CAUTION

When removing or installing CRT, be careful not to bend CRT neck pins.

l. To reinstall CRT, reverse removal procedure; however, do not tighten clamp screw until after shield is secured with four screws and CRT is positioned against front mount. The shield does not have to press completely onto front mount.

8-15. HIGH-VOLTAGE POWER SUPPLY ASSEMBLY REMOVAL AND REPLACEMENT. To remove High-voltage Power Supply Assembly A15, see figure 6-1 and proceed as follows:

a. Remove HV cover (MP54).

b. Discharge high voltage by shorting test point A15TP1 to chassis.

WARNING

Failure to discharge high voltage can result in severe electrical shock to personnel and damage to the instrument.

c. Disconnect two (6) wires and one (2) wire on FOCUS potentiometer A12R22 from A15.

d. Disconnect (956) and (957) wires from rear of A15.

e. Remove CRT socket cover (MP33).

f. Disconnect CRT socket.

g. Remove plug to HV oscillator, Q1. Note plug orientation (wires remain parallel from board to device).

h. Disconnect Gate Amplifier Assembly A12 from Low-voltage Power Supply Assembly A16.

i. Disconnect A15 from A12.

WARNING

When performing next step, discharge high voltage by holding insulated part of wires and touching the two leads together.

j. Lift A15 and disconnect the (0) wire and the large wire from HV Multiplier Assembly A6.

k. Remove A15.

l. To reinstall A15, reverse removal procedure; remembering to again short (0) wire and large wire from HV multiplier as in step j.

8-16. HV MULTIPLIER ASSEMBLY REMOVAL AND REPLACEMENT. To remove HV Multiplier Assembly A6, see figure 6-1 and proceed as follows:

a. Disconnect post-accelerator lead from CRT and immediately discharge lead to ground.

WARNING

Failure to discharge high voltage can result in severe electrical shock to personnel and damage to the instrument.

b. Remove High-voltage Power Supply Assembly A15 (see paragraph 8-15).

c. Remove bracket over A6 (two screws to chassis and two screws to rear panel).

d. Lift bracket off large wire to A6.

e. Disconnect post-accelerator lead cable clamp.

f. Remove two screws securing A6 to chassis and remove A6.

g. To reinstall A6, reverse removal procedure.

8-17. LOW-VOLTAGE POWER SUPPLY ASSEMBLY REMOVAL AND REPLACEMENT. To remove Low-voltage Power Supply Assembly A16, see figures 6-1 and 8-3 and proceed as follows:

NOTE

Removal of A16 is not necessary unless it must be replaced; all work can be performed with A16 in place except for repair or replacement of line selection and on-off switches.

a. Remove Interface Assembly A14.

b. Disconnect gate output wires (9) and (3).

c. Disconnect two plugs to power transformer.

d. Remove line cover (MP57) by removing two screws.

e. Disconnect ac input leads (90) and (908).

f. Disconnect five plugs to series regulators (Q2-6).

g. Remove five screws holding A16 to chassis.

h. Disconnect plug to Gate Amplifier Assembly A12.

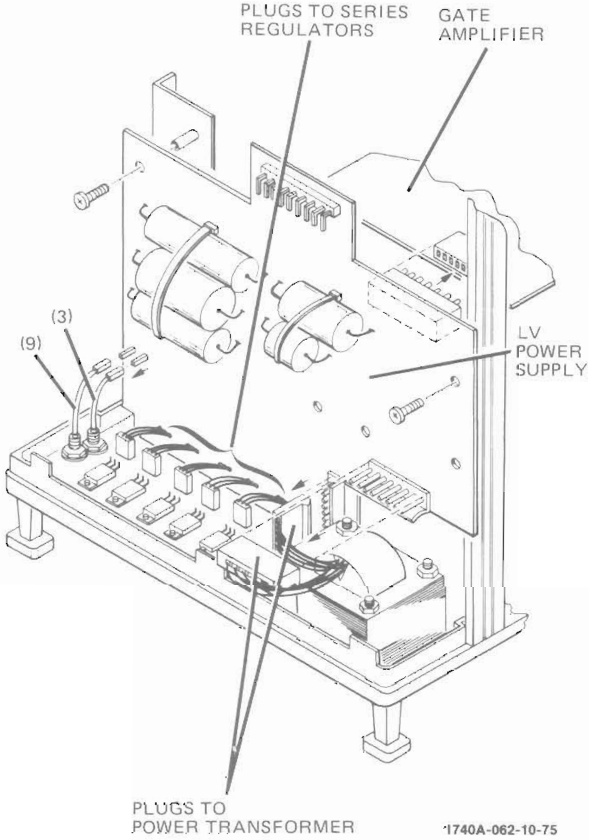


Figure 8-3. LV Power Supply Removal

i. Carefully lift A16 and move toward front of instrument. LINE switch shaft will protrude through front panel.

j. Unscrew LINE switch shaft and extract it.

k. Remove button from shaft; A16 can now be removed.

l. To reinstall A16, reverse removal procedure, except after A16 is secured in place, screw LINE switch shaft into switch (switch must be in "out" position) until slot is halfway through bezel, then press button onto shaft (refer to paragraph 8-18, figure 8-4).

8-18. GATE AMPLIFIER ASSEMBLY REMOVAL AND REPLACEMENT. To remove Gate Amplifier Assembly A12, see figures 6-1 and 8-4 and proceed as follows:

a. Remove HVPS cover (MP54).

b. Disconnect nine wires on component side of A12.

c. Disconnect two (6) wires and one (2) wire from FOCUS potentiometer to A15 (HVPS).

d. Disconnect (9) Z-axis wire on rear of A12.

e. Remove FOCUS and INTENSITY shafts from potentiometers using small hex wrench (Allen 050).

f. Disconnect A12 from A16 (LVPS).

g. Disconnect A12 from A15 (HVPS).

h. Remove BEAM FIND shaft by pushing A12 forward so that button clears front panel and unscrew shaft.

i. Remove button from shaft.

j. Remove A12.

k. To reinstall A12, reverse the removal procedure, except install BEAM FIND shaft and adjust so slot is halfway through bezel after HVPS cover (MP54) is secured; then install button.

8-19. VERTICAL OUTPUT AMPLIFIER ASSEMBLY REMOVAL AND REPLACEMENT. To remove Vertical Output Amplifier Assembly A5, see figure 8-5 and proceed as follows:

a. Disconnect delay line wires (4), (6), and (0) from back of A5.

b. Disconnect CRT leads (3) and (9).

c. Disconnect plug to Vertical Preamplifier Assembly A3 (push down gently on A3).

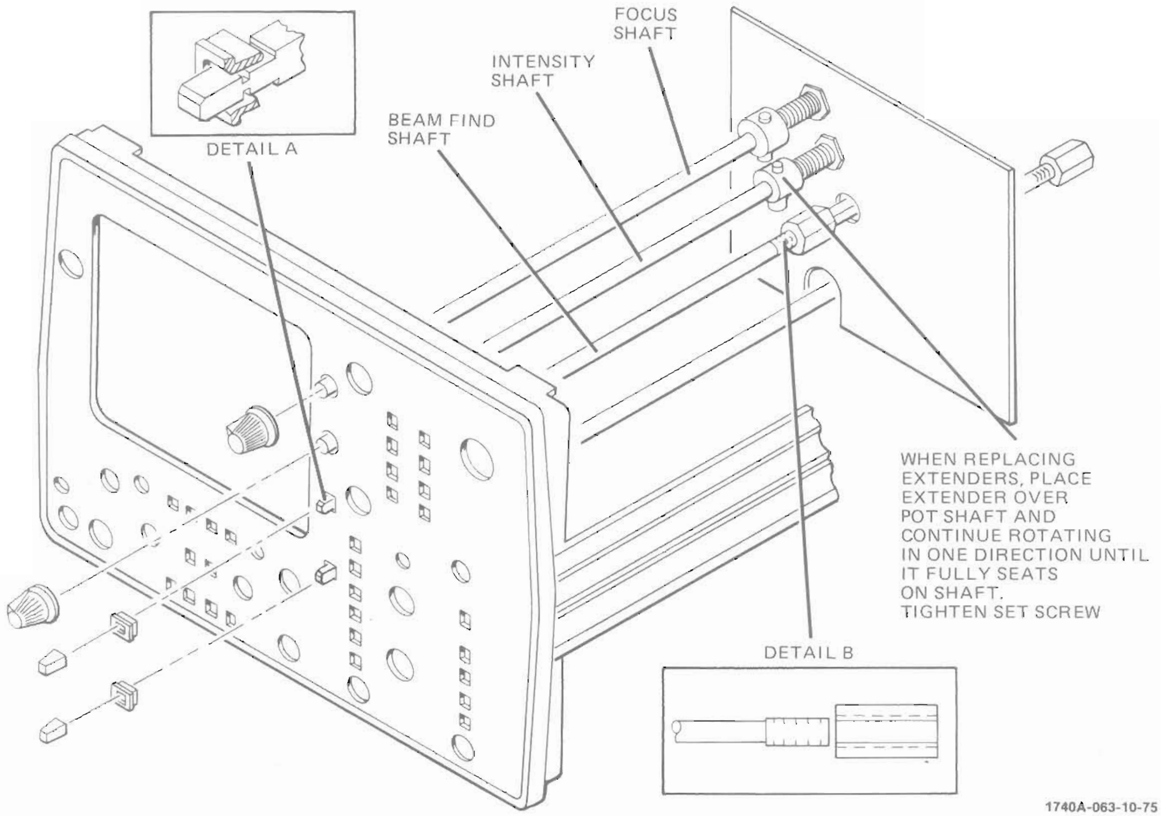

FOCUS SHAFT
INTENSITY SHAFT
BEAM FIND SHAFT
DETAIL A
WHEN REPLACING EXTENDERS, PLACE EXTENDER OVER POT SHAFT AND CONTINUE ROTATING IN ONE DIRECTION UNTIL IT FULLY SEATS ON SHAFT. TIGHTEN SET SCREW
DETAIL B
1740A-063-10-75

Figure 8-4. Gate Amplifier Assembly Removal

d. Remove four screws that hold A5 and bracket to chassis, and remove assembly.

e. Remove two screws holding A5 to bracket and heat sink, and remove board.

f. To reinstall A5, reverse removal procedure.

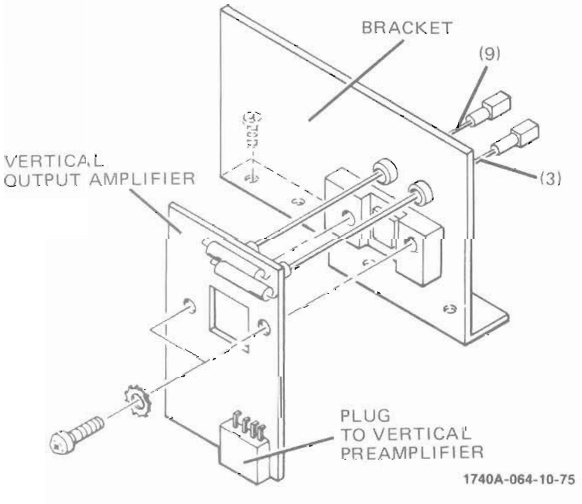

BRACKET
(9)
(3)
VERTICAL OUTPUT AMPLIFIER
PLUG TO VERTICAL PREAMPLIFIER
1740A-064-10-75

Figure 8-5. Vertical Output Amplifier Removal

8-20. Vertical Output Amplifier IC A5A1 Removal and Replacement. To remove A5A1, see figure 8-6 and proceed as follows:

a. Remove Vertical Output Amplifier A5 as described in paragraph 8-19.

b. A5A1 can be removed from heat sink. (Heat sink can remain on bracket or be removed.)

c. To reinstall A5A1, reverse the removal procedure, being certain to note orientation of parts as shown in figure 8-6.

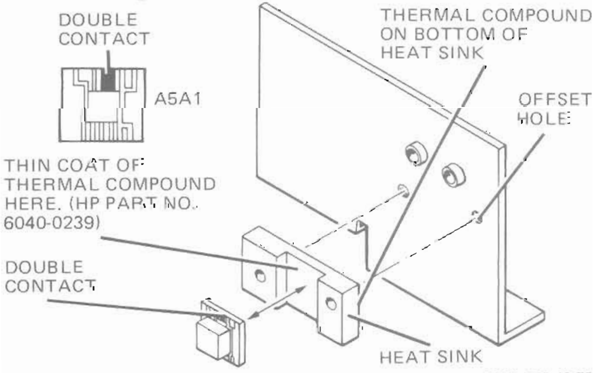

DOUBLE CONTACT
A5A1
THERMAL COMPOUND ON BOTTOM OF HEAT SINK
OFFSET HOLE
THIN COAT OF THERMAL COMPOUND HERE. (HP PART NO. 6040-0239)
DOUBLE CONTACT
HEAT SINK
1740A-065-10-75

Figure 8-6. A5A1 Removal

8-21. VERTICAL PREAMPLIFIER ASSEMBLY A3, DELAY LINE ASSEMBLY A4, AND VERTICAL CONTROL SWITCHING ASSEMBLY A13 REMOVAL AND REPLACEMENT. To remove A3, A4, and A13 Assemblies, proceed as follows:

a. Disconnect Interface Assembly A14.

b. Remove channel A and B POS, vernier, coupling, and VOLTS/DIV knobs.

c. Remove nuts and washers from both input BNC connectors.

d. Disconnect (9) wire from calibrator output.

e. Disconnect delay line wires (4), (6), and (0) from rear of Vertical Output Amplifier A5.

f. Remove delay line clamp screw from chassis.

g. Disconnect twin leads (3, 4) and (1, 9) at Horizontal Sweep Assembly A7.

h. Remove channel A attenuator shield by removing three screws.

i. Remove screw that connects Horizontal Sweep Assembly A7, shield, and A3 together. This screw is close to point where (1, 9) twin lead attaches to A7.

j. Disconnect plug to A5.

k. Carefully tilt A3 outward and extract toward rear.

l. Disconnect vernier UNCAL light cable (95), (96), and two (0) wires.

m. To reinstall, reverse removal procedure.

8-22. Vertical Control Switching Assembly A13 Removal and Replacement. To remove A13 assembly, proceed as follows:

a. Remove A3 assembly as described in paragraph 8-21.

b. Disconnect wires (4) and (9) from channel A and B vernier potentiometers (total of four wires).

c. Disconnect wires (3), (93), (913), (7), and (8) from front of A13.

d. Remove screw on component side of A3 that screws into standoff on A13 near delay line.

e. Disconnect two plugs to Vertical Preamplifier Assembly A3.

f. To reinstall A13, reverse removal procedure.

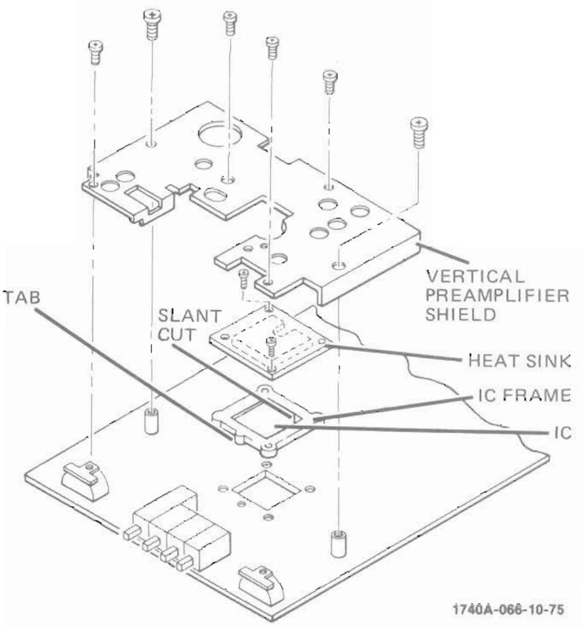


Figure 8-7. A3A1 Removal

8-23. Vertical Preamplifier IC A3A1 Removal and Replacement. To remove assembly A3A1, see figure 8-7 and proceed as follows:

a. Disconnect twin lead (2, 6).

b. Remove six screws that hold vertical preamplifier shield (MP45) to vertical preamplifier A3, and remove shield.

c. Remove two remaining screws that hold heat sink (MP61) to A3.

d. Lift heat sink off IC frame (MP26).

e. Lift IC frame and IC off A3.

f. To reinstall IC, reverse removal procedure; be certain that orientation of parts is as shown in figure 8-7.

8-24. MAIN SWEEP ASSEMBLY AND DELAYED SWEEP ASSEMBLY REMOVAL AND REPLACEMENT. To remove Main Sweep Assembly A8 and Delayed Sweep Assembly A9, proceed as follows:

a. Loosen hex screws on the three shaft collars.

b. Set MAIN TIME/DIV to 1 μSEC and DLY'D TIME/DIV to OFF.

c. Sweep time shaft can now be removed.

d. Remove A8 by pulling from socket.

e. Remove A9 by gently rocking board toward rear of instrument to disconnect it from the two connectors.

8-25. HORIZONTAL OUTPUT ASSEMBLY REMOVAL AND REPLACEMENT. To remove Horizontal Output Assembly A11, proceed as follows:

a. Disconnect (2) and (9) wires from A11.

b. Remove A11 from connector by first pulling top of A11 away from Horizontal Sweep Assembly A7 and then pulling bottom of A11.

c. To reinstall A11, reverse the removal procedure.

8-26. HORIZONTAL SWEEP ASSEMBLY REMOVAL AND REPLACEMENT. To remove Horizontal Sweep Assembly A7, proceed as follows:

a. Remove assemblies A8 and A9 (paragraph 8-24).

b. Remove assembly A11 as explained in paragraph 8-25.

c. Unsolder resistor from main EXT TRIGGER BNC connector J1.

d. Remove two cable connector plugs.

e. Remove twin leads (3, 4) and (1, 9).

f. Remove main TRIGGER LEVEL knob and nut from potentiometer.

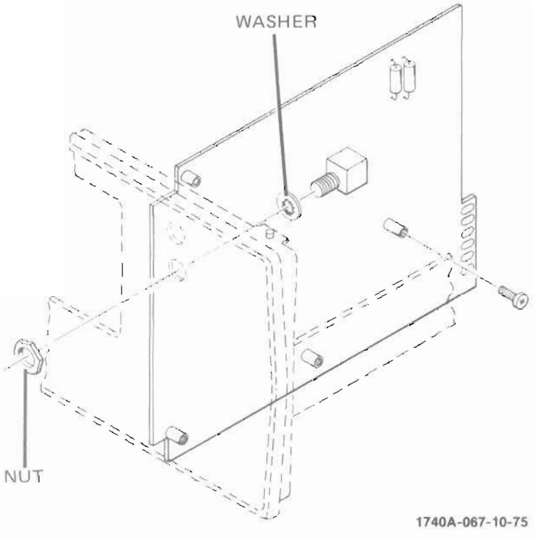


Figure 8-8. Location of A7 Attaching Screws

g. Remove Interface Assembly A14.

h. Remove four screws holding A7 to sheet metal (figure 8-8).

i. Remove A7 by pulling it toward rear and tilting away from sheet metal deck. Save lockwasher on trigger level potentiometer for reinstallation.

j. To reinstall, reverse the removal procedure, except install four screws (step h) without tightening them until nut on TRIGGER LEVEL potentiometer (step f) is tightened. Lockwasher must be in place on TRIGGER LEVEL potentiometer before inserting in panel.

8-27. DELAYED TRIGGER ASSEMBLY REMOVAL AND REPLACEMENT. To remove the Delayed Trigger Assembly A10, proceed as follows:

a. Remove Delayed Sweep Assembly A9 (paragraph 8-24).

b. Unsolder resistor from delayed EXT TRIGGER BNC connector.

c. Remove delayed TRIGGER LEVEL knob and nut underneath.

d. Remove screw from A10 (corner next to delayed EXT TRIGGER BNC connector).

e. Gently pull A10 to rear and remove from instrument. Save lockwasher on TRIGGER LEVEL potentiometer for reinstallation.

f. To reinstall A10, reverse removal procedure; lockwasher must be in place on TRIGGER LEVEL potentiometer before inserting it in front panel.

8-28. CIRCUIT BOARD REPAIRS.

8-29. The following paragraphs provide information for repairing etched circuit boards.

8-30. BOARD CONNECTIONS. Square-pin connectors are identified on circuit boards by color code of connecting wire or by the signal name. Each connector pin on plugs and jacks are identified by either a numeral of a letter; letters G, I, O, and Q are not used.

8-31. SOLDERING. All the etched circuit boards have plated-through component holes. This allows soldered-in components to be removed or replaced from either side of the board. When removing or replacing a semiconductor, use long-nosed pliers as a heat sink between the device and the soldering iron. See figure 8-9 for more information on semiconductors. HP Service Note M-20E contains additional information for repair of etched circuit boards.

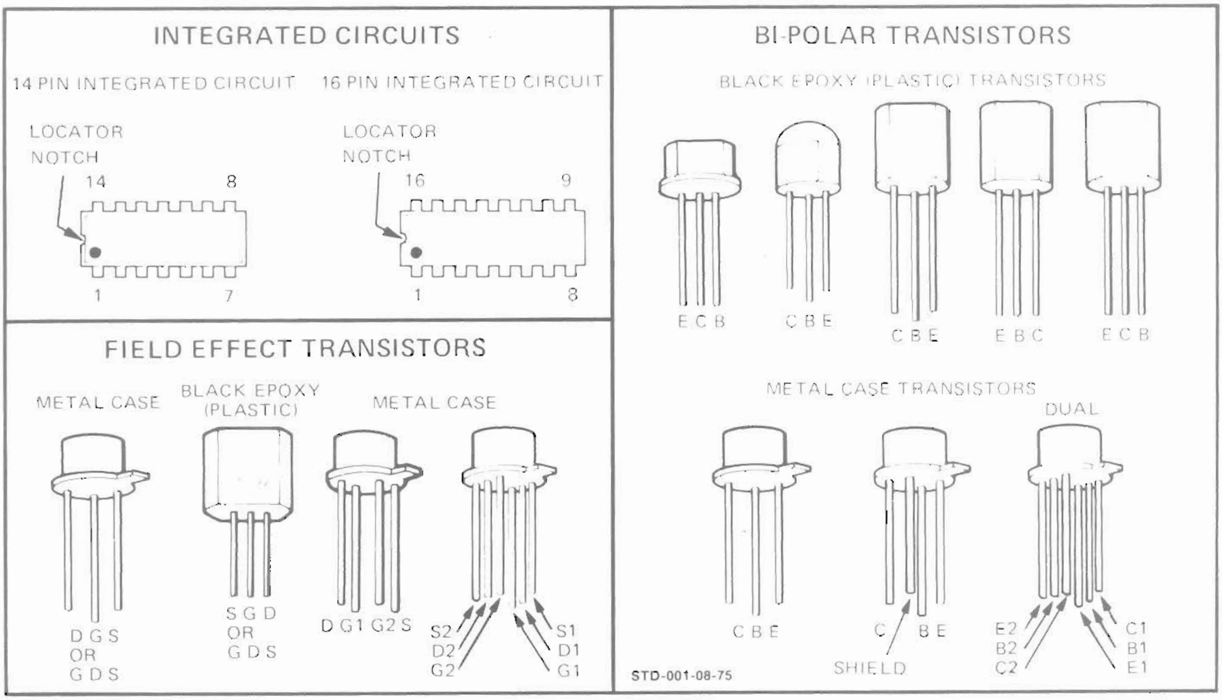

INTEGRATED CIRCUITS
14 PIN INTEGRATED CIRCUIT
16 PIN INTEGRATED CIRCUIT
LOCATOR NOTCH
14
8
1
7
LOCATOR NOTCH
16
9
1
8
FIELD EFFECT TRANSISTORS
METAL CASE
BLACK EPOXY (PLASTIC)
METAL CASE
D G S OR G D S
S G D OR G D S
D G1 G2 S
S2 D2 G2
S1 D1 G1
BI-POLAR TRANSISTORS
BLACK EPOXY (PLASTIC) TRANSISTORS
E C B
C B E
C B E
E B C
E C B
METAL CASE TRANSISTORS
DUAL
C B E
C B E
SHIELD
E2 B2 C2
C1 B1 E1
STD-001-08-75

Figure 8-9. Semiconductor Terminal Identification

8-32. INTEGRATED CIRCUIT REMOVAL AND REPLACEMENT. The integrated circuits (IC's) in this instrument are plug-in types. Remove a plug-in integrated circuit with a straight pull away from the board. When replacing an integrated circuit, note the mark or notch used for pin number identification (see figure 8-9).

CAUTION

Unless an integrated circuit has definitely failed, be careful to prevent damage when removing or replacing it.

8-33. TROUBLESHOOTING.

WARNING

Read the Safety Summary at the front of this manual before troubleshooting the instrument.

8-34. Two important prerequisites for successful troubleshooting are: (1) understanding how the instrument is designed to operate and (2) knowing the correct use of front-panel controls. Improper control settings or circuit connections can cause apparent malfunctions. Read Section III for an explanation of controls, connectors, and general operating considerations. Read Section IV for circuit theory and principles of operation.

8-35. If trouble is suspected, visually inspect the instrument. Look for loose or burned components that may suggest a source of trouble. Verify that all circuit board connections are making good contact and are not shorting to an adjacent circuit. If no obvious trouble is found, check power supply voltages in the instrument; also check the external power source.

8-36. INITIAL TROUBLESHOOTING PROCEDURE. Before troubleshooting the Model 1740A in detail, try to perform the adjustment procedures listed in Section V of this manual. Some apparent malfunctions may be corrected by these adjustments, or failure to obtain a correct adjustment will often reveal the source of trouble.

8-37. DC VOLTAGES AND WAVEFORMS. Dc voltages, waveforms, and conditions for making these measurements are given on or adjacent to the schematics. Since conditions for making the measurements may differ from one circuit to another, always check the specific conditions listed for each schematic.

8-38. TROUBLE DIAGNOSIS. By the use of front-panel controls, note as many symptoms of the malfunction as possible. From these symptoms it can usually be determined which section (vertical, horizontal, power supplies, or high voltage) is malfunctioning. But even if the problem is in the vertical or horizontal section, it is still good practice to check the low-voltage power supplies, since an out-of-tolerance supply can affect the operation of other circuits. Table 8-1 lists the sequence of checks that should be used when troubleshooting.

Table 8-1. Troubleshooting Sequence

CHECK	COMMENT
1. LVPS	All other functions rely on LVPS for proper operation.
2. CRT & HVPS	All high voltages and CRT must function to obtain a display.
3. GATE AMPLIFIER	CRT must be unblanked to display signal.
4. VERTICAL SECTION	After obtaining a visible beam, begin checking deflection circuitry.
5. HORIZONTAL OUTPUT AMPLIFIER	To distinguish between time base and horizontal output amplifier problems, apply signal to channel B (in A VS B mode); if deflection occurs, horizontal output amplifier is operating properly.
6. SWEEP	After checking horizontal output amplifier, check ramp generating circuitry (in AUTO mode). When auto sweep is operating properly, check trigger circuit.

8-39. LOW-VOLTAGE POWER SUPPLY. All voltages: +5 V, +43 V, + 120 V, —15 V, and the high voltage are referenced to the +15 V supply, so it must be made operational first. The supplies are current-limiting type, so any excessive loading from the vertical, horizontal, etc., will cause the supply to read 20 to 30% low.

8-40. To quickly check if an external load is causing Low-voltage Power Supply A16 to current-limit and read low, remove Interface Assembly A14 that connects the power supply to Vertical Preamplifier A3 and Horizontal Sweep Assembly A7. If the supplies return to normal, then an external short is definitely loading the supply. Assembly A3 can be flexed upward, so A14 can be connected between assemblies A16 and A7. This will help determine if the problem is on A3 or A7. It is also possible to disconnect the Gate Amplifier A12 and HV Power Supply A15, from assembly A16 by disconnecting A15 from the bottom of A16.

8-41. HIGH-VOLTAGE POWER SUPPLY AND CRT. To troubleshoot HV Power Supply A15, remove the HV cover and reinstall the two screws closest to the rear of the instrument. This provides the necessary ground connections for assembly A15.

WARNING

Use extreme care when working on an active high-voltage power supply.

8-42. The high-voltage oscillator, collector, and base waveform measurements are accessible directly on assembly A15, as well as control grid and cathode voltages. A high voltage disable circuit turns off the oscillator if the +120 V supply drops to less than +100 V. This protects the CRT from high beam current and burns.

8-43. If grid and cathode voltages are present on A15, verify that voltages are present at the CRT socket; a faulty socket or wire can cause an open circuit.

CAUTION

When measuring high voltages, always use a 1000:1 probe with an impedance of 100 MΩ or greater.

8-44. Common CRT problems consists of open filaments, grid-cathode shorts (uncontrollable beam), and "hollow cathodes", sometimes referred to as "double-peaking". Hollow cathodes can be detected by increasing intensity. As the intensity knob is rotated clockwise, the beam will get brighter, up to a point; beyond this point it will decrease in brilliance and may defocus.

8-45. If the high voltage is low, and low voltages are correct, check for a faulty high-voltage transformer, leaky capacitors, or resistors that may have changed in value (typical problem with extremely large resistors - 30 MΩ, etc.).

8-46. Faulty high-voltage multipliers usually cause the display to be of low intensity and out of focus. Multipliers can sometimes be checked by measuring the output with a high-voltage probe.

8-47. GATE AMPLIFIER. Malfunctions in Gate Amplifier Assembly A12 will usually be transistor failures in output driver stages. At high intensity levels, these transistors are sometimes operating at fairly high voltages and are therefore subject to failure.

8-48. VERTICAL SECTION. Problems in the vertical amplifier may show up as a variety of symptoms. Low gain problems may be located by applying an input signal and monitoring it through the various stages (refer to waveforms adjacent to schematics). Attenuator problems may be either on the attenuator itself or within the vertical preamplifier substrate A3A1.

8-49. Problems can be isolated to either substrate A3A1 or to Vertical Output Assembly A5 by pressing TRIG VIEW on the front panel while applying a known signal to the main EXT TRIGGER input. If it is displayed properly (approximately 100 mV/div), this indicates that assembly A5 is operating properly and the problem is in substrate A3A1.

8-50. Bandwidth, rise time, or pulse response problems can be caused by dirty CRT neck pins or by a faulty delay line. However, they are most likely caused by defective amplifiers or improper adjustment.

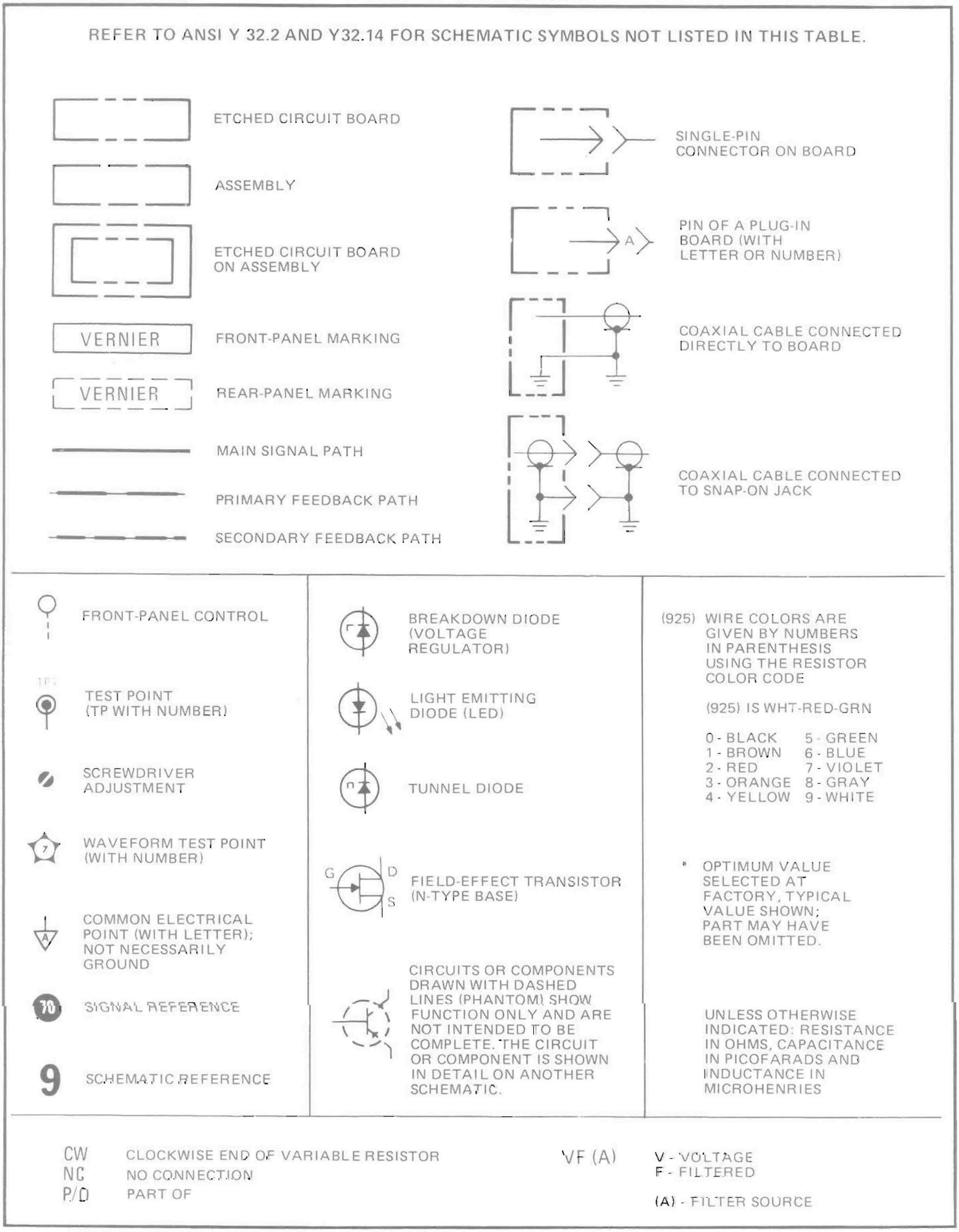
8-51. HORIZONTAL OUTPUT AMPLIFIER. If no horizontal deflection can be obtained under normal sweep conditions, the problem may be either in the time base or Horizontal Output Assembly A11. To quickly determine which is at fault, put the oscilloscope in the A VS B mode and connect a 1-kHz sine wave to the channel B input. If horizontal deflection is present, the horizontal amplifier (and sync amplifier) are operating properly and the problem is in the time base. If no horizontal deflection occurs, then assembly A11 is probably defective.

8-52. TIME BASE. Troubleshooting the time base can be difficult since it is a closed loop circuit and waveforms may be nonexistent in any part of the loop. Table 8-2 will help analyze problems under a no-sweep condition. Select main sweep, set the main TIME/DIV control to .1 mSEC, and put all other time base pushbuttons in the out position. This puts the time base in an auto sweep mode. Set INTENSITY to approximately midrange and set FOCUS fully CCW.

Table 8-2. Time Base Troubleshooting

INDICATION	PROBLEM CAUSE
Is baseline present?	YES - Check input circuitry (HF/LF amplifiers or sync amplifier) NO - Proceed to next step
RESET Lamp OFF Beam OFF Beam position left (Using BEAM FIND)	Check reset/holdoff circuitry
RESET Lamp OFF Beam OFF Beam position right (Using BEAM FIND)	Check Miller integrator and associated circuitry
RESET Lamp OFF Beam ON	With RESET lamp OFF, beam should NEVER be ON. Check gate amplifier circuitry and CRT for grid-cathode short; then return to time base troubleshooting
RESET Lamp ON Beam OFF	With RESET lamp ON, beam should also be ON. Check gate amplifier and HVPS; then return to time base to repair second problem.
RESET Lamp ON Beam ON (Left side)	Check Miller integrator and associated circuitry
RESET Lamp ON Beam ON (Right side)	Check sweep reset circuitry

Table 8-3. Schematic Notes



REFER TO ANSI Y 32.2 AND Y32.14 FOR SCHEMATIC SYMBOLS NOT LISTED IN THIS TABLE.

ETCHED CIRCUIT BOARD

ASSEMBLY

ETCHED CIRCUIT BOARD ON ASSEMBLY

VERNIER — FRONT-PANEL MARKING

VERNIER — REAR-PANEL MARKING

MAIN SIGNAL PATH

PRIMARY FEEDBACK PATH

SECONDARY FEEDBACK PATH

SINGLE-PIN CONNECTOR ON BOARD

PIN OF A PLUG-IN BOARD (WITH LETTER OR NUMBER)

COAXIAL CABLE CONNECTED DIRECTLY TO BOARD

COAXIAL CABLE CONNECTED TO SNAP-ON JACK

FRONT-PANEL CONTROL

TEST POINT (TP WITH NUMBER)

SCREWDRIVER ADJUSTMENT

WAVEFORM TEST POINT (WITH NUMBER)

COMMON ELECTRICAL POINT (WITH LETTER); NOT NECESSARILY GROUND

SIGNAL REFERENCE

9 SCHEMATIC REFERENCE

BREAKDOWN DIODE (VOLTAGE REGULATOR)

LIGHT EMITTING DIODE (LED)

TUNNEL DIODE

FIELD-EFFECT TRANSISTOR (N-TYPE BASE)

CIRCUITS OR COMPONENTS DRAWN WITH DASHED LINES (PHANTOM) SHOW FUNCTION ONLY AND ARE NOT INTENDED TO BE COMPLETE. THE CIRCUIT OR COMPONENT IS SHOWN IN DETAIL ON ANOTHER SCHEMATIC.

(925) WIRE COLORS ARE GIVEN BY NUMBERS IN PARENTHESIS USING THE RESISTOR COLOR CODE

(925) IS WHT-RED-GRN

0 - BLACK	5 - GREEN
1 - BROWN	6 - BLUE
2 - RED	7 - VIOLET
3 - ORANGE	8 - GRAY
4 - YELLOW	9 - WHITE

* OPTIMUM VALUE SELECTED AT FACTORY, TYPICAL VALUE SHOWN; PART MAY HAVE BEEN OMITTED.

UNLESS OTHERWISE INDICATED: RESISTANCE IN OHMS, CAPACITANCE IN PICOFARADS AND INDUCTANCE IN MICROHENRIES

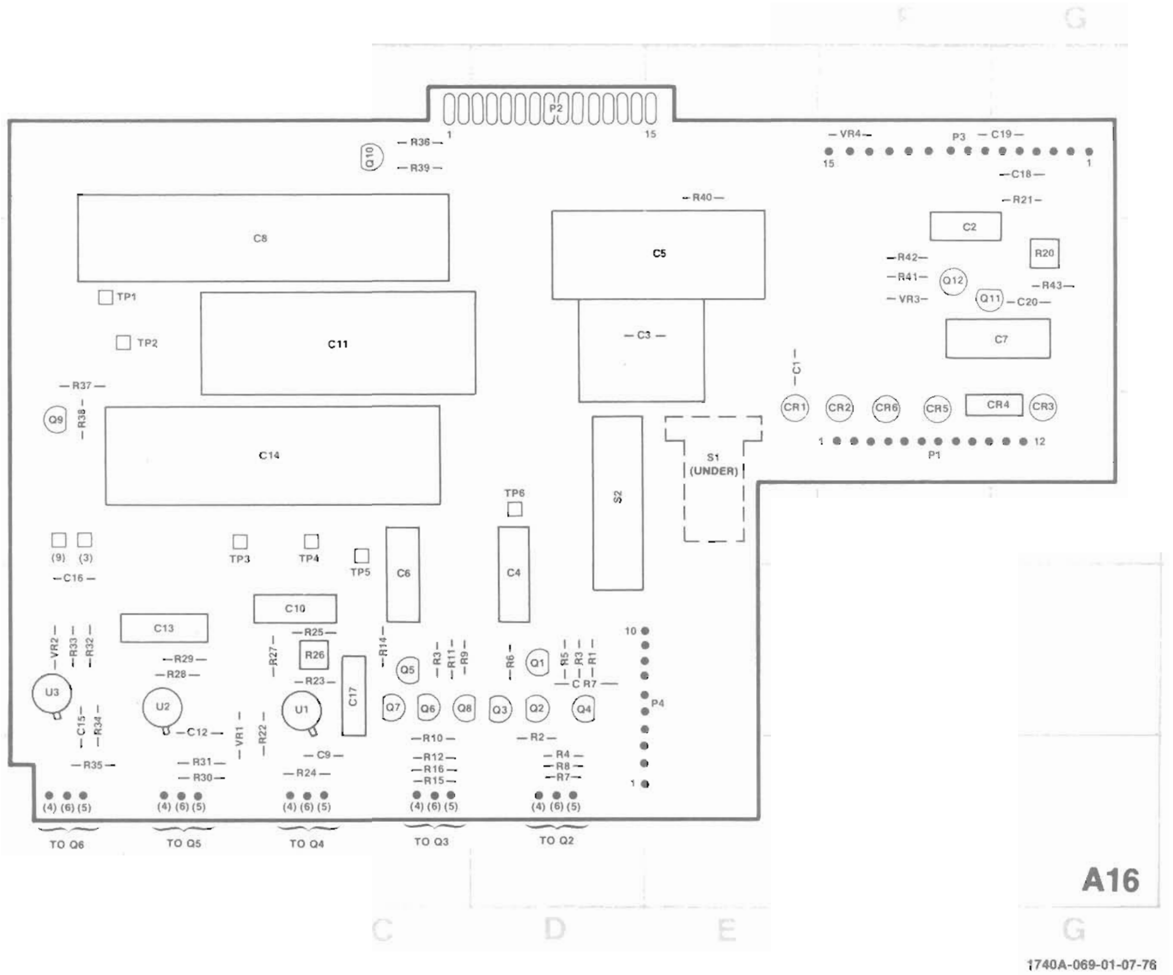
CW	CLOCKWISE END OF VARIABLE RESISTOR
NC	NO CONNECTION
P/O	PART OF

VF (A)

V - VOLTAGE

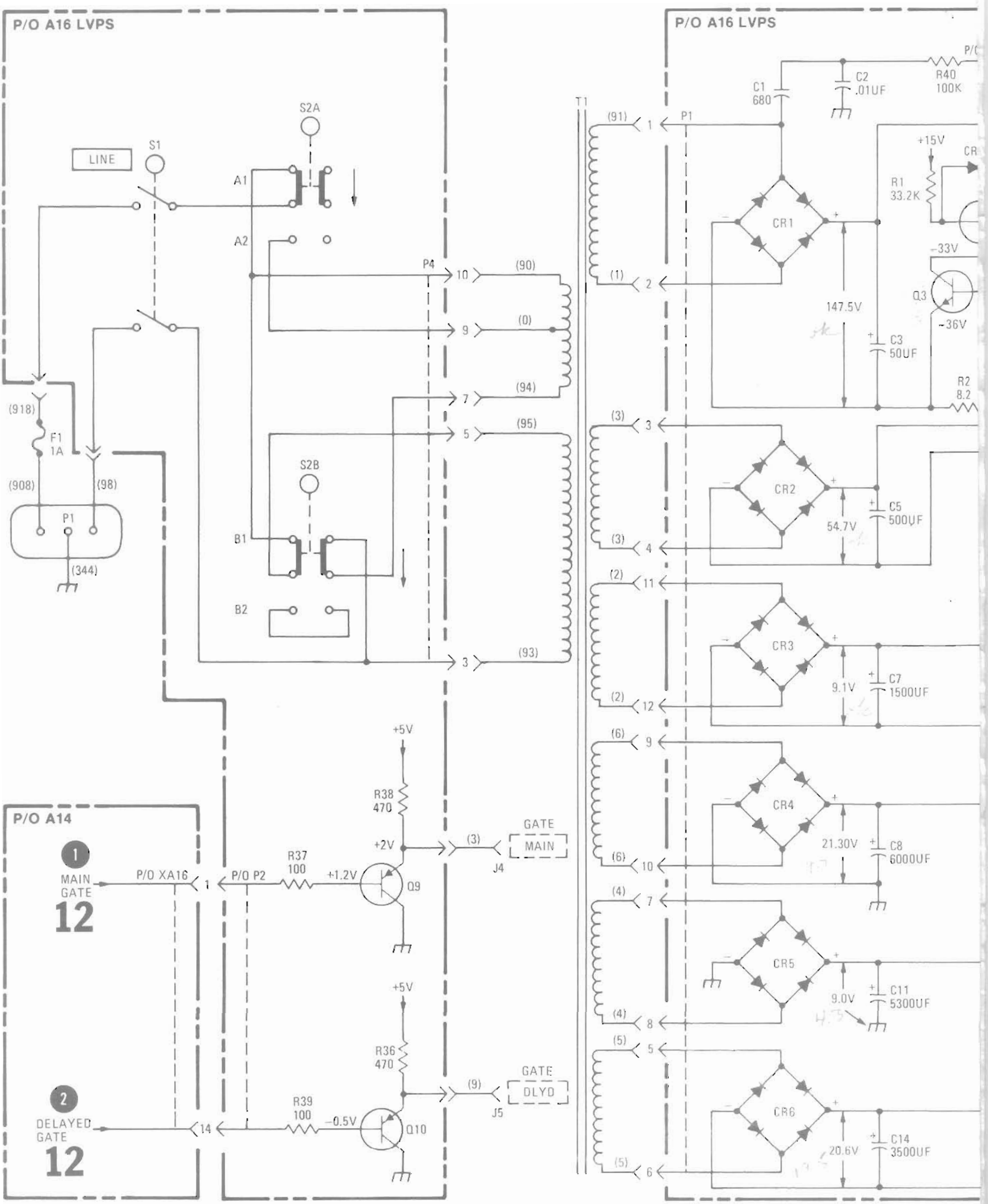
F - FILTERED

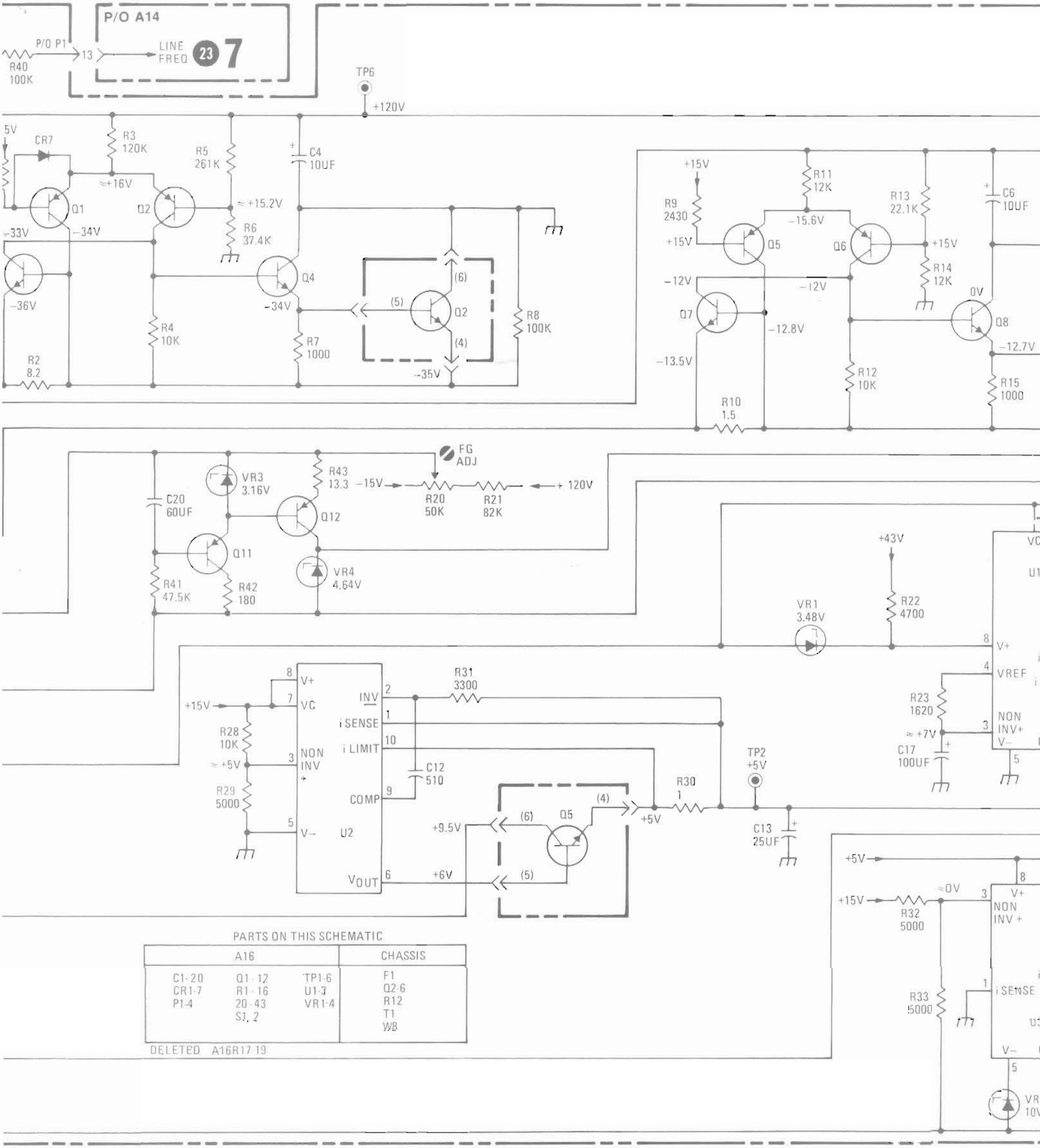
(A) - FILTER SOURCE


G
P2
1
15
R36
R39
Q10
VR4
P3
C19
15
1
C18
R21
R40
C8
C5
C2
R20
R42
R41
Q12
R43
VR3
Q11
C20
TP1
C11
C3
C7
TP2
C1
R37
CR1
CR2
CR6
CR5
CR4
CR3
Q9
R38
C14
1
12
P1
S1
(UNDER)
S2
TP6
(9)
(3)
TP3
TP4
TP5
C6
C4
C16
C10
C13
R25
10
R29
R28
R27
R26
R14
R3
R11
R9
R6
R5
R3
R1
VR2
R33
R32
Q5
Q1
R23
C R7
U3
U2
U1
C17
Q7
Q6
Q8
Q3
Q2
Q4
P4
C15
R34
C12
VR1
R22
R10
R2
C9
R35
R31
R30
R24
R12
R16
R15
R4
R8
R7
1
(4) (6) (5)
(4) (6) (5)
(4) (6) (5)
(4) (6) (5)
(4) (6) (5)
TO Q6
TO Q5
TO Q4
TO Q3
TO Q2
A16
C
D
E
G
1740A-069-01-07-76

REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC
C1	E-2	C14	B-3	P1	F-3	Q11	F-2	R13	C-4	R30	B-5	S2	D-3
C2	F-2	C15	A-4	P2	D-1	Q12	F-2	R14	C-4	R31	B-5	TP1	A-2
C3	E-2	C16	A-4	P3	F-1	R1	D-4	R15	C-5	R32	A-4	TP2	B-2
C4	D-3	C17	C-4	P4	E-4	R2	D-4	R16	C-5	R33	A-4	TP3	B-3
C5	E-2	C18	G-1	Q1	D-4	R3	D-4	R20	G-2	R34	A-4	TP4	C-3
C6	C-3	C19	G-1	Q2	D-4	R4	D-5	R21	G-1	R35	A-5	TP5	C-3
C7	G-2	C20	G-2	Q3	D-4	R5	D-4	R22	B-5	R36	C-1	TP6	D-3
C8	B-2	CR1	E-3	Q4	D-4	R6	D-4	R23	C-4	R37	A-2	U1	C-4
C9	C-5	CR2	F-3	Q5	C-4	R7	D-5	R24	C-5	R38	A-3	U2	B-4
C10	C-4	CR3	G-3	Q6	C-4	R8	D-5	R25	C-4	R40	C-1	U3	A-4
C11	C-2	CR4	G-3	Q7	C-4	R9	D-4	R26	C-4	R41	F-2	VR1	B-5
C12	B-4	CR5	F-3	Q8	D-4	R10	C-5	R27	C-4	R42	F-2	VR2	A-4
C13	B-4	CR6	F-3	Q9	A-3	R11	C-4	R28	B-4	R43	G-2	VR3	F-2
		CR7	D-4	Q10	C-1	R12	C-5	R29	B-4	S1	E-3	VR4	F-1

Figure 8-10. Service Information, Low-voltage Power Supply Assembly A16 (Sheet 1 of 2)

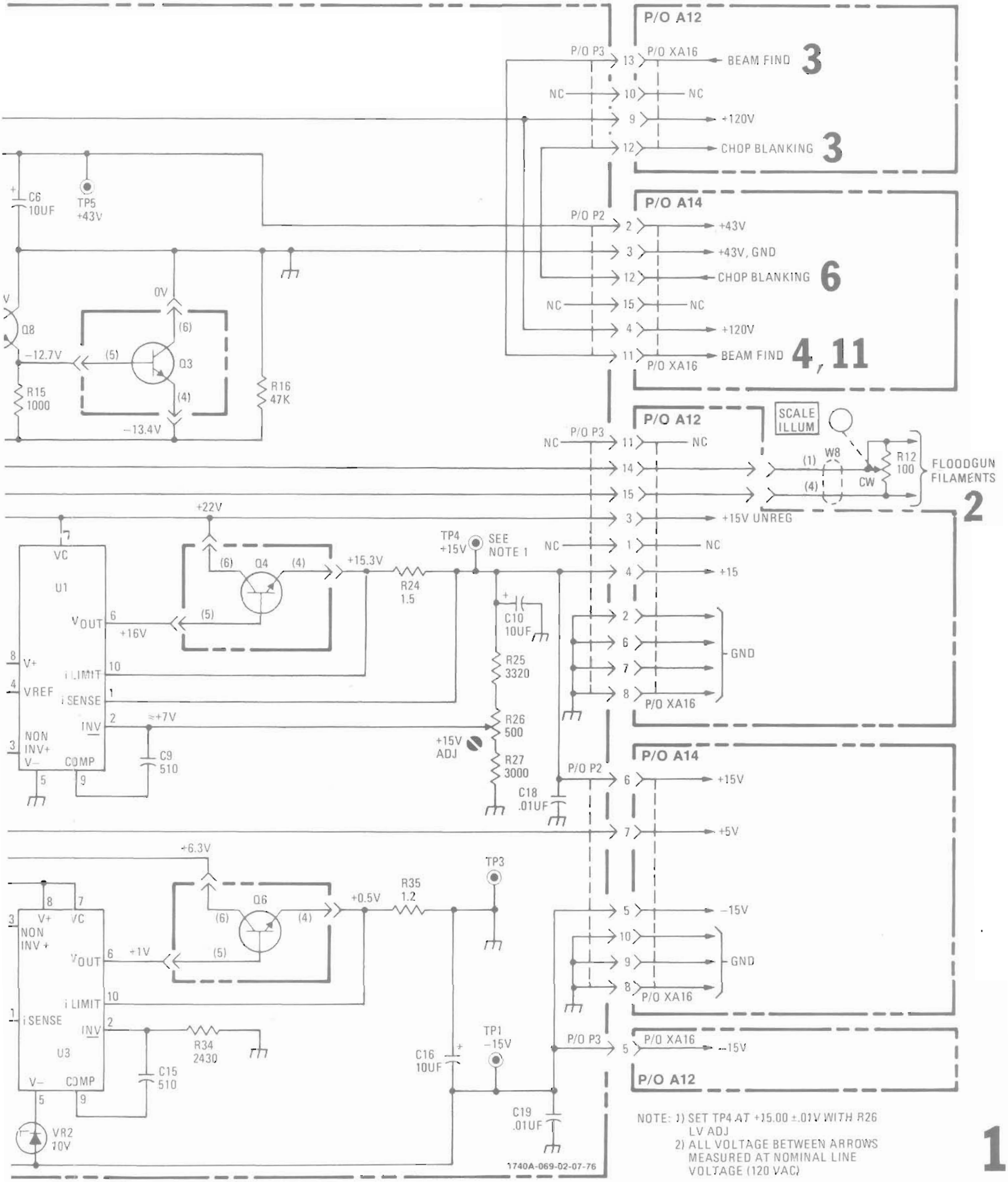

P/O A16 LVPS
LINE
S1
S2A
A1
A2
P4
10
(90)
9
(0)
7
(94)
5
(95)
S2B
B1
B2
3
(93)
(918)
F1
1A
(908)
(98)
P1
(344)
+5V
R38
470
+2V
GATE
MAIN
(3)
J4
P/O A14
1
MAIN
GATE
12
P/O XA16
P/O P2
R37
100
+1.2V
Q9
+5V
R36
470
GATE
DLYD
(9)
J5
2
DELAYED
GATE
12
14
R39
100
-0.5V
Q10
T1
P/O A16 LVPS
(91)
1
P1
(1)
2
C1
680
C2
.01UF
R40
100K
+15V
R1
33.2K
CR1
-33V
Q3
-36V
147.5V
C3
50UF
R2
8.2
(3)
3
(3)
4
CR2
54.7V
C5
500UF
(2)
11
(2)
12
CR3
9.1V
C7
1500UF
(6)
9
(6)
10
CR4
21.30V
C8
6000UF
(4)
7
(4)
8
CR5
9.0V
4.5
C11
5300UF
(5)
5
(5)
6
CR6
20.6V
C14
3500UF


P/O A14
P/O P1
13
LINE FREQ
23
7
R40 100K
TP6
+120V
5V
CR7
R3 120K
≈+16V
R5 261K
≈ +15.2V
C4 10UF
Q1
Q2
-33V
-34V
R6 37.4K
Q4
-34V
-36V
(6)
(5)
Q2
(4)
-35V
R8 100K
R4 10K
R7 1000
R2 8.2
+15V
R9 2430
R11 12K
R13 22.1K
C6 10UF
-15.6V
+15V
Q5
Q6
+15V
R14 12K
-12V
-12V
Q7
-12.8V
0V
Q8
-12.7V
-13.5V
R12 10K
R15 1000
R10 1.5
FG ADJ
VR3 3.16V
R43 13.3
-15V
R20 50K
R21 82K
+ 120V
C20 60UF
Q12
Q11
VR4 4.64V
R41 47.5K
R42 180
+43V
VC
U1
VR1 3.48V
R22 4700
8 V+
4 VREF
R23 1620
≈ +7V
C17 100UF
NON INV+
3
V−
5
8 V+
7 VC
+15V
R28 10K
≈ +5V
R29 5000
3 NON INV +
5 V−
U2
INV 2
i SENSE 1
i LIMIT 10
COMP 9
VOUT 6
R31 3300
C12 510
+9.5V
(6)
Q5
(4)
(5)
+6V
+5V
R30 1
TP2 +5V
C13 25UF
+5V
8
+15V
≈0V
3 V+
NON INV +
R32 5000
R33 5000
1 i SENSE
V−
5
VR
10V

PARTS ON THIS SCHEMATIC

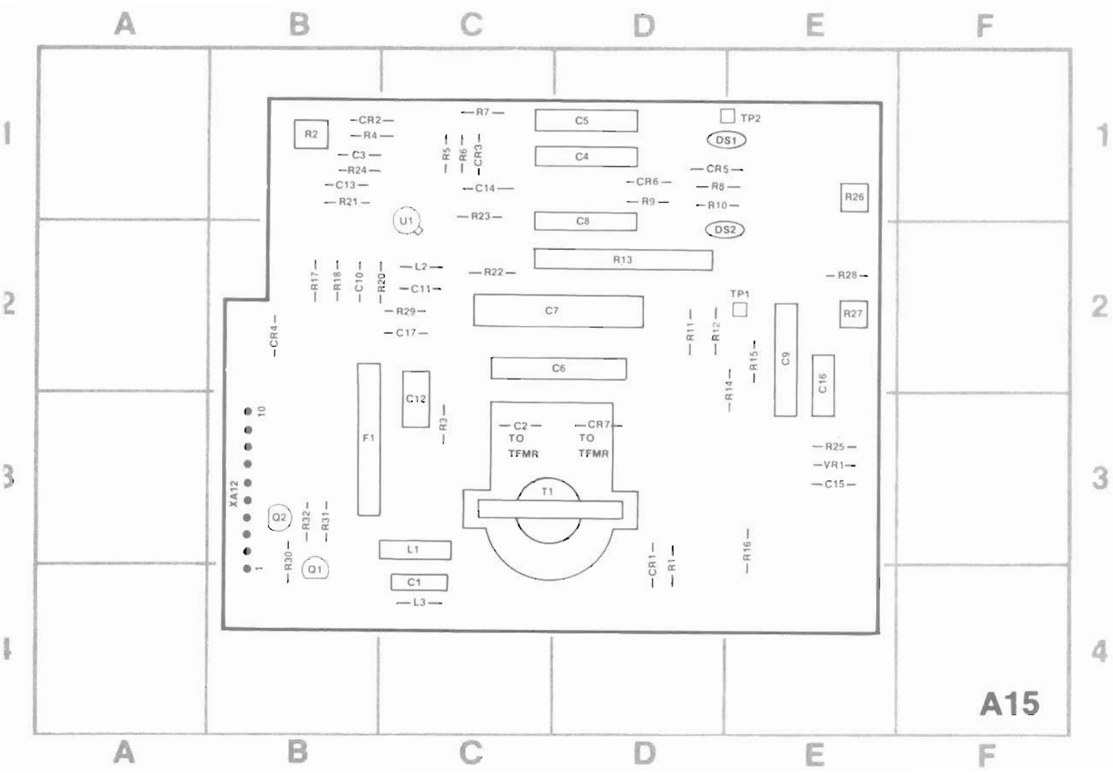
A16			CHASSIS
C1-20 CR1-7 P1-4	Q1-12 R1-16 20-43 S1, 2	TP1-6 U1-3 VR1-4	F1 Q2-6 R12 T1 W8

DELETED A16R17 19


P/O A12
P/O P3
P/O XA16
13
BEAM FIND
3
NC
10
9
+120V
12
CHOP BLANKING
3
C6
10UF
TP5
+43V
P/O A14
P/O P2
2
+43V
3
+43V, GND
12
CHOP BLANKING
6
0V
(6)
NC
15
4
+120V
Q8
−12.7V
(5)
Q3
11
BEAM FIND
4, 11
R15
1000
(4)
R16
47K
−13.4V
P/O A12
SCALE ILLUM
NC
11
14
(1)
W8
R12
100
FLOODGUN FILAMENTS
15
(4)
CW
2
+22V
3
+15V UNREG
VC
U1
(6)
Q4
(4)
+15.3V
TP4
+15V
SEE NOTE 1
NC
1
4
+15
R24
1.5
VOUT
6
(5)
+16V
C10
10UF
2
6
7
8
GND
V+
I LIMIT
10
R25
3320
VREF
I SENSE
1
NON INV+
INV
2
≈+7V
R26
500
+15V ADJ
C9
510
R27
3000
V−
COMP
5
9
C18
.01UF
P/O P2
P/O A14
6
+15V
7
+5V
+6.3V
TP3
Q6
R35
1.2
+0.5V
(6)
(4)
V+
VC
NON INV+
VOUT
6
+1V
(5)
5
−15V
10
9
8
GND
I LIMIT
10
I SENSE
INV
2
R34
2430
U3
TP1
−15V
C16
10UF
P/O P3
5
P/O XA16
−15V
C15
510
V−
COMP
P/O A12
C19
.01UF
VR2
10V
1740A-069-02-07-76
1

NOTE: 1) SET TP4 AT +15.00 ±.01V WITH R26 LV ADJ
2) ALL VOLTAGE BETWEEN ARROWS MEASURED AT NOMINAL LINE VOLTAGE (120 VAC)

Figure 8-10.
Service Information, Low-voltage Power Supply Assembly A16 (Sheet 2 of 2)


A
B
C
D
E
F
1
2
3
4
R2
CR2
R4
C3
R24
C13
R21
R7
R5
R6
CR3
C14
R23
U1
C5
C4
C8
CR6
R9
TP2
DS1
CR5
R8
R10
DS2
R26
R17
R18
C10
R20
L2
C11
R29
C17
R22
R13
C7
R28
TP1
R27
CR4
R11
R12
R15
R14
C9
C16
C6
C12
R3
F1
10
C2
TO
TFMR
CR7
TO
TFMR
R25
VR1
C15
XA12
T1
Q2
R32
R31
R30
Q1
1
L1
C1
L3
CR1
R1
R16
A15

1740A-070-10-75

REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC
C1	C-4	C11	C-2	CR4	B-2	Q1	B-4	R9	D-1	R20	B-2	R30	B-3
C2	C-3	C12	C-3	CR5	D-1	Q2	B-3	R10	D-1	R21	B-1	R31	B-3
C3	B-1	C13	B-1	CR6	D-1	R1	D-4	R11	D-2	R22	C-2	R32	B-3
C4	D-1	C14	C-1	CR7	D-3	R2	B-1	R12	D-2	R23	C-1	T1	C-3
C5	D-1	C15	E-3	DS1	E-1	R3	C-3	R13	D-2	R24	B-1	TP1	E-2
C6	D-2	C16	E-2	DS2	D-2	R4	B-1	R14	E-2	R25	E-3	TP2	E-1
C7	D-2	C17	C-2	F1	B-3	R5	C-1	R15	E-2	R26	E-1	U1	C-2
C8	D-2	CR1	D-4	L1	C-3	R6	C-1	R16	E-3	R27	E-2	VR1	E-3
C9	E-2	CR2	B-1	L2	C-2	R7	C-1	R17	B-2	R28	E-2	XA12	B-3
C10	B-2	CR3	C-1	L3	C-4	R8	D-1	R18	B-2	R29	C-2		

DC VOLTAGE MEASUREMENT CONDITIONS
SCHEMATIC 2

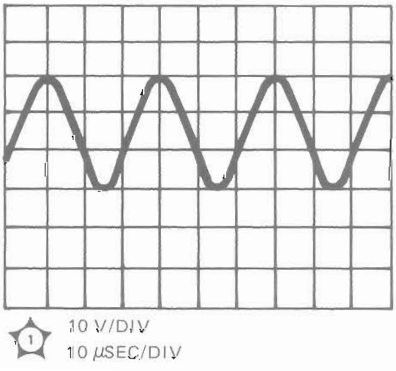
1. Set front-panel controls in accordance with initial control settings in Section V.
2. All voltages are referenced to chassis ground. All indications are nominal and 15% variations from those indicated should be considered normal.

WARNING

Voltages in the HIGH VOLTAGE Area are dangerous to life. Use extreme care in making measurements and observe precautions listed in the SAFETY SUMMARY at the front of this manual.

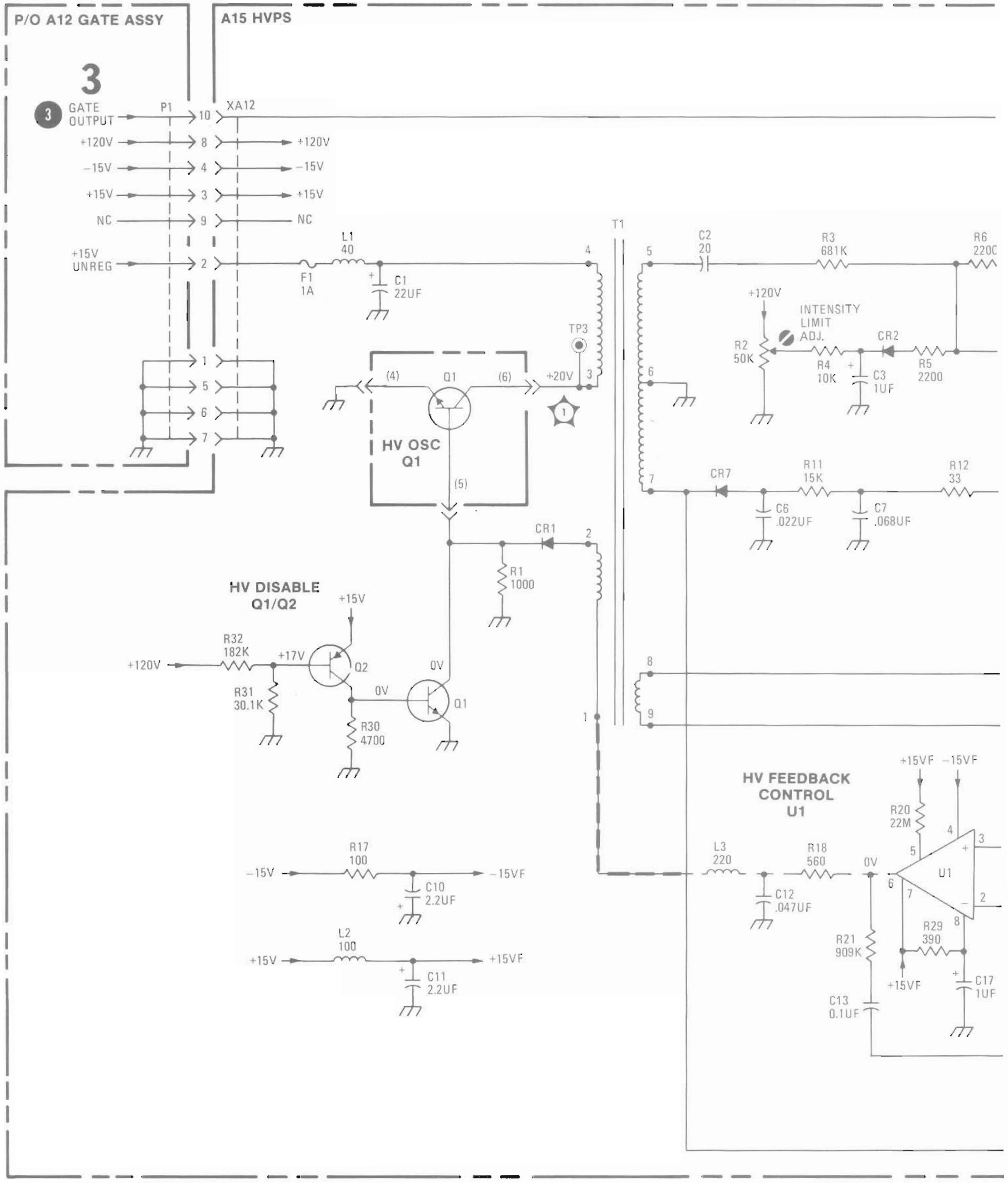
WAVEFORM MEASUREMENT CONDITIONS
SCHEMATIC 2

1. Set front-panel controls in accordance with initial control settings in Section V.
2. Set monitor oscilloscope TIME/DIV and VOLTS/DIV controls as indicated under waveform(s).



1740A-071-01-10-75

Figure 8-11. Service Information, High-voltage Power Supply Assembly A15 (Sheet 1 of 2)


P/O A12 GATE ASSY
3
3 GATE OUTPUT
P1
XA12
+120V
−15V
+15V
NC
+15V UNREG
A15 HVPS
L1 40
F1 1A
C1 22UF
T1
TP3
+20V
(4)
Q1
(6)
HV OSC Q1
(5)
1
CR1
R1 1000
HV DISABLE Q1/Q2
+15V
R32 182K
+17V
Q2
0V
R31 30.1K
R30 4700
R17 100
−15VF
C10 2.2UF
L2 100
+15VF
C11 2.2UF
C2 20
R3 681K
R6 220
+120V
INTENSITY LIMIT ADJ.
R2 50K
R4 10K
C3 1UF
CR2
R5 2200
CR7
R11 15K
R12 33
C6 .022UF
C7 .068UF
HV FEEDBACK CONTROL U1
L3 220
R18 560
C12 .047UF
+15VF −15VF
R20 22M
U1
R21 909K
C13 0.1UF
R29 390
C17 1UF

PARTS ON THIS SCHEMATIC

A15		P/O A12	CHASSIS
C1-17, CR1-7, DS1, 2 F1, L1-3 Q1, 2	R1-18 20-32 T1 TP1,2, 3 U1 VR1	R22	A6 L1 Q1 V1

DELETED: A15R19

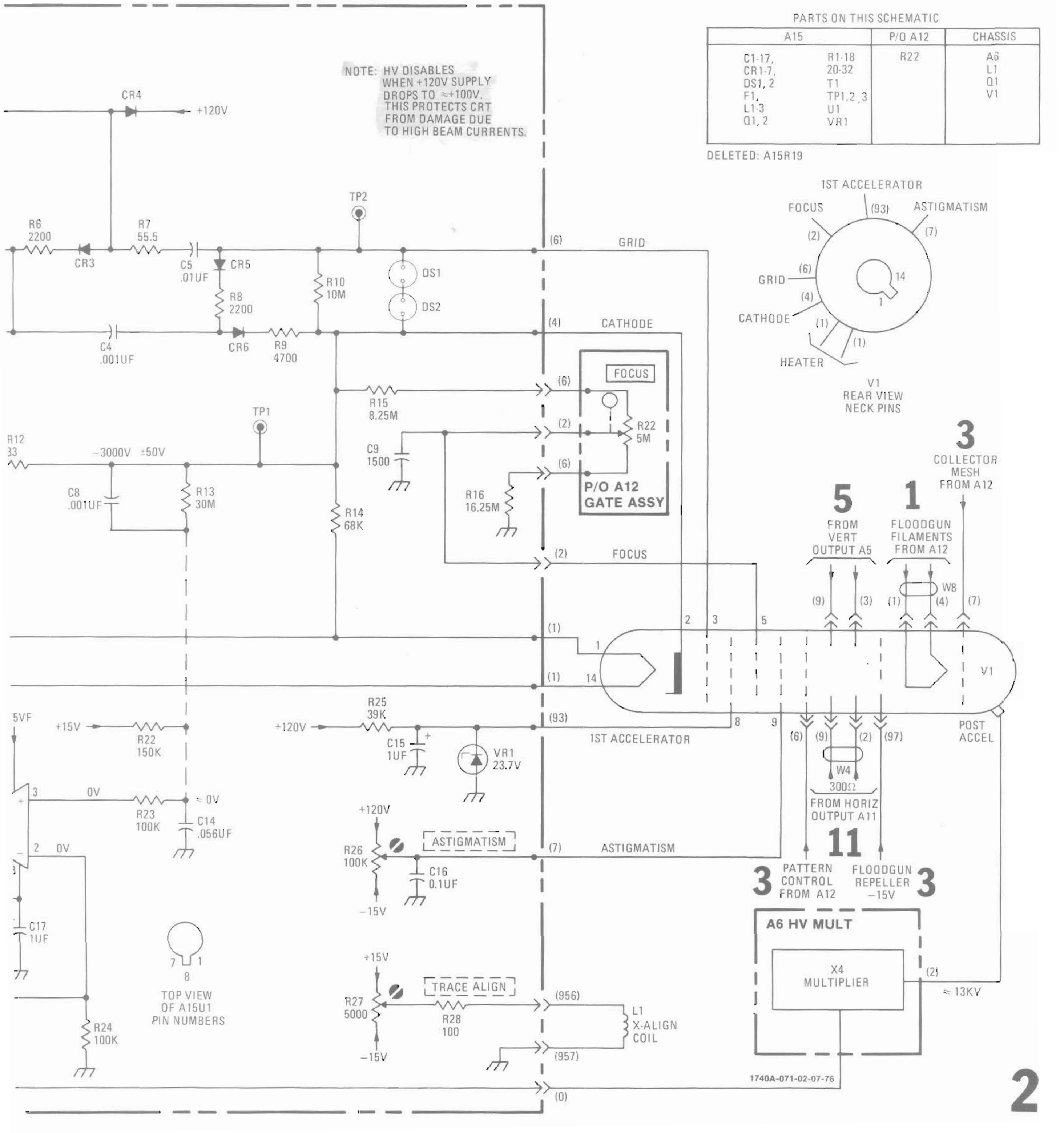
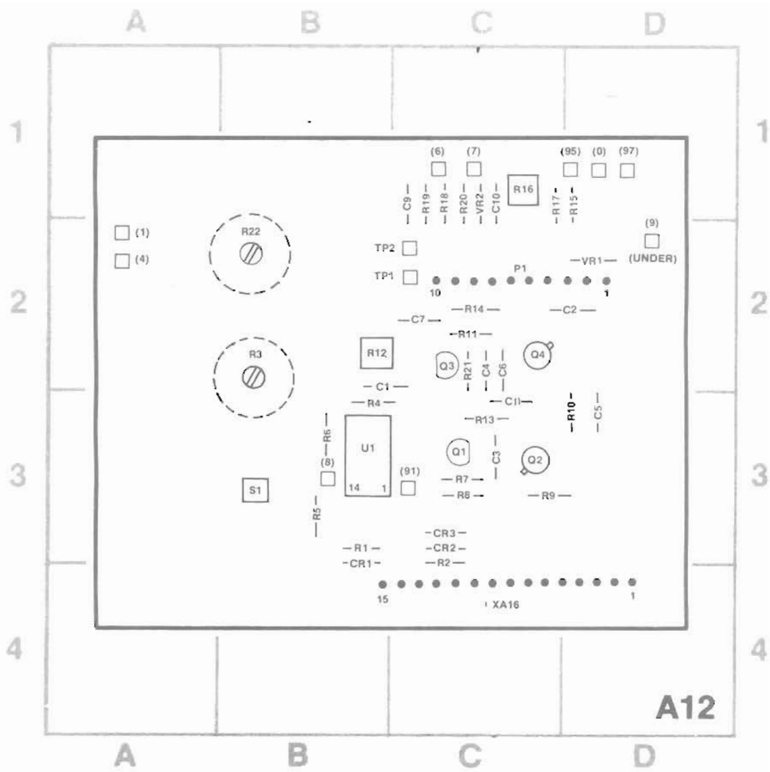

NOTE: HV DISABLES WHEN +120V SUPPLY DROPS TO ≈+100V. THIS PROTECTS CRT FROM DAMAGE DUE TO HIGH BEAM CURRENTS.
CR4
+120V
R6 2200
CR3
R7 55.5
C5 .01UF
CR5
R8 2200
C4 .001UF
CR6
R9 4700
R10 10M
TP2
DS1
DS2
(6) GRID
(4) CATHODE
FOCUS
R15 8.25M
R22 5M
C9 1500
R16 16.25M
P/O A12 GATE ASSY
(2) FOCUS
TP1
R12 33
-3000V ±50V
C8 .001UF
R13 30M
R14 68K
(1)
(1) 14
R25 39K
+120V
C15 1UF
VR1 23.7V
(93) 1ST ACCELERATOR
5VF
+15V
R22 150K
0V
R23 100K
≈ 0V
C14 .056UF
2 0V
C17 1UF
R24 100K
+120V
R26 100K
ASTIGMATISM
C16 0.1UF
-15V
(7) ASTIGMATISM
+15V
R27 5000
TRACE ALIGN
R28 100
-15V
(956)
L1 X-ALIGN COIL
(957)
(0)
TOP VIEW OF A15U1 PIN NUMBERS
1ST ACCELERATOR
FOCUS
ASTIGMATISM
GRID
CATHODE
HEATER
V1 REAR VIEW NECK PINS
3 COLLECTOR MESH FROM A12
5 FROM VERT OUTPUT A5
1 FLOODGUN FILAMENTS FROM A12
W8
V1
POST ACCEL
W4 300Ω
FROM HORIZ OUTPUT A11
11
3 PATTERN CONTROL FROM A12
FLOODGUN REPELLER -15V 3
A6 HV MULT
X4 MULTIPLIER
(2)
≈ 13KV
1740A-071-02-07-76
2

Figure 8-11.
Service Information, High-voltage Power Supply Assembly A15 (Sheet 2 of 2)


A
B
C
D
1
2
3
4
(6)
(7)
(95)
(0)
(97)
R16
C9
R19
R18
R20
VR2
C10
R17
R15
(1)
(4)
R22
(9)
(UNDER)
TP2
TP1
VR1
P1
10
1
R14
C2
C7
R11
R3
R12
Q3
R21
C4
C6
Q4
C1
R4
C11
R10
C5
R13
R6
U1
Q1
C3
Q2
(8)
(91)
14
1
S1
R7
R8
R9
R5
CR3
R1
CR2
CR1
R2
15
1
XA16
A12

1740A-072-07-76

REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC
C1	B-2	CR1	B-4	R3	B-2	R13	C-3	S1	B-3
C2	D-2	CR2	C-3	R4	B-3	R14	C-2	TP1	C-2
C3	C-3	CR3	C-3	R5	B-3	R15	D-1	TP2	C-2
C4	C-2	P1	C-2	R6	B-3	R16	C-1	U1	B-3
C5	D-3	Q1	C-3	R7	C-3	R17	C-1	VR1	D-2
C6	C-2	Q2	C-3	R8	C-3	R18	C-1	VR2	C-1
C7	C-2	Q3	C-2	R9	C-3	R19	C-1	XA16	C-4
C9	C-1	Q4	C-2	R10	D-3	R20	C-1		
C10	C-1	R1	B-3	R11	C-2	R21	C-2		
C11	C-3	R2	C-3	R12	B-2	R22	B-2		

DC VOLTAGE MEASUREMENT CONDITIONS
SCHEMATIC 3

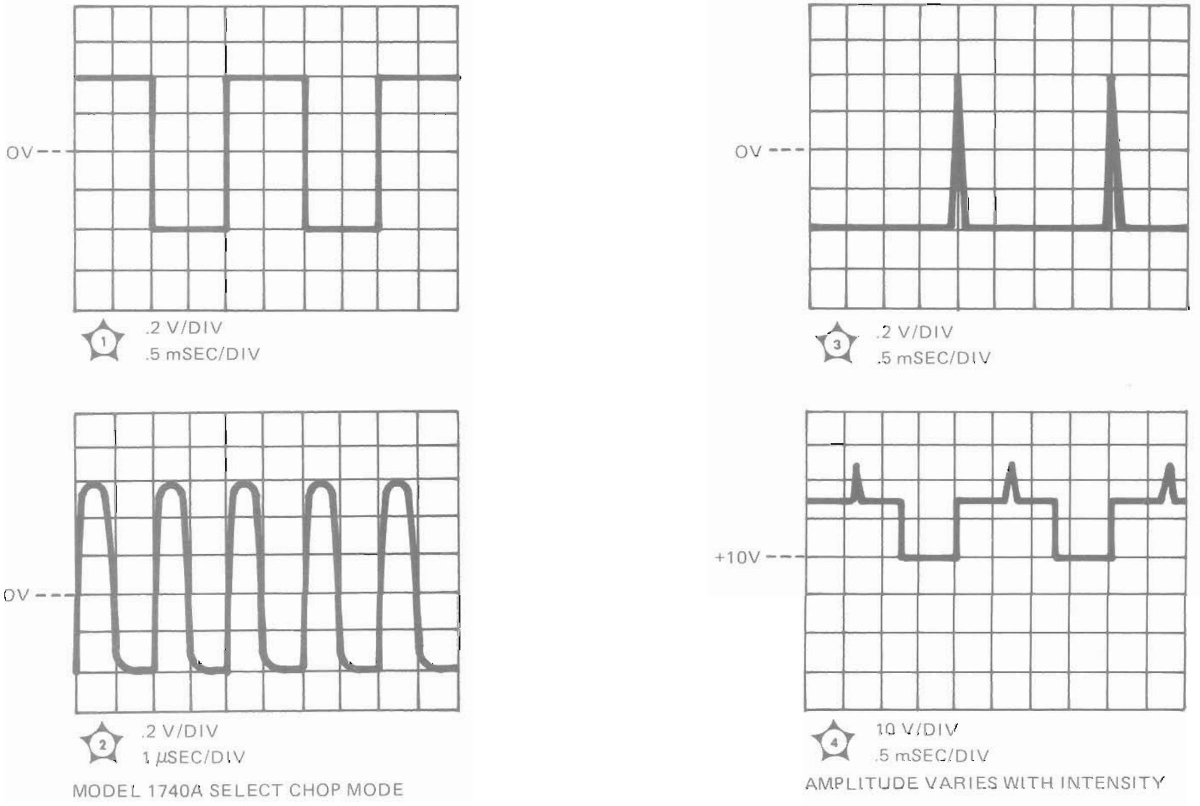
1. Set front-panel controls in accordance with initial control settings in Section V.
2. All voltages are referenced to chassis ground. All indications are nominal and 15% variation from those indicated should be considered normal.

WAVEFORM MEASUREMENT CONDITIONS
SCHEMATIC 3

1. Set front-panel controls in accordance with initial control settings in Section V, except as follows:

Coupling (channel A)	50Ω
TIME/DIV (delayed)	1 μSEC
DELAY	5.00
Horiz display	MAIN
TRIGGER LEVEL (main)	stable display

2. Set monitor oscilloscope TIME/DIV and VOLTS/DIV controls as indicated under waveform(s).
3. Connect HP Model 211B Square-wave Generator 50-ohm output to Model 1740A channel A INPUT connector.
4. Adjust square-wave generator output for 6 divisions of signal amplitude (.6 Vpk) at 5 kHz.

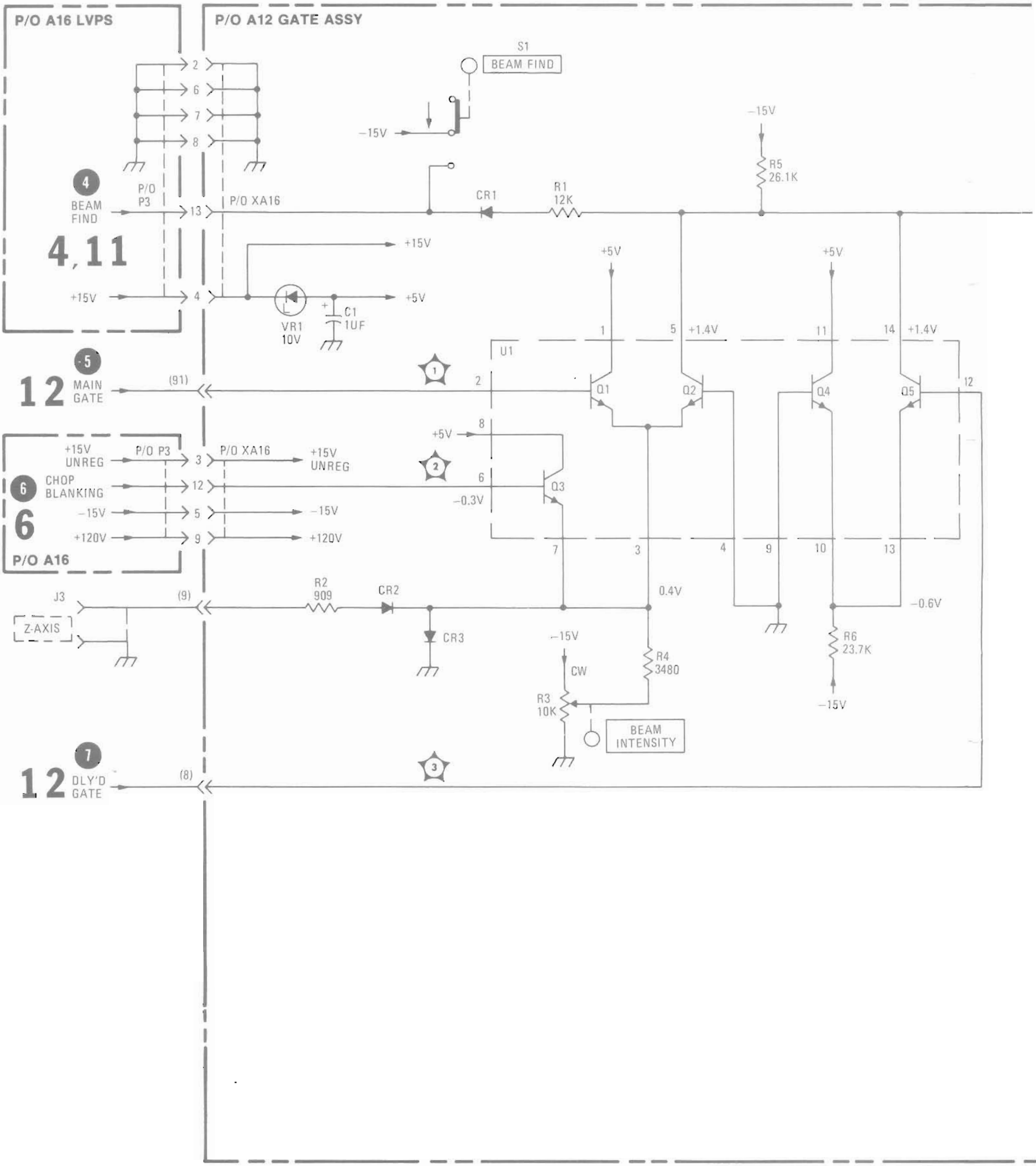


MODEL 1740A SELECT CHOP MODE

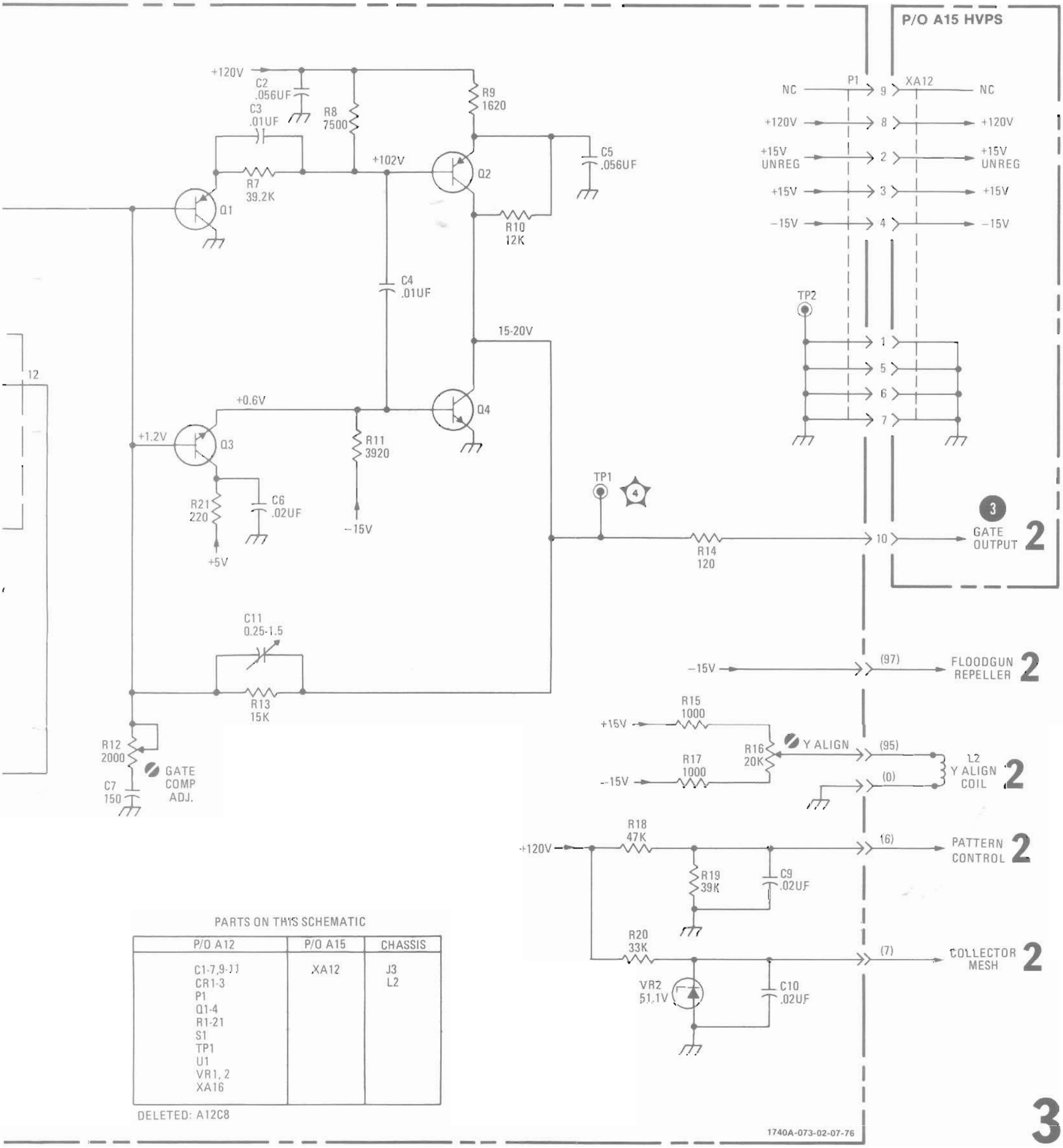
AMPLITUDE VARIES WITH INTENSITY

1740A-073-01-10-75

Figure 8-12. Service Information, Gate Amplifier Assembly A12 (Sheet 1 of 2)



P/O A16 LVPS
P/O A12 GATE ASSY
S1
BEAM FIND
−15V
2
6
7
8
4
BEAM FIND
P/O P3
13
P/O XA16
4,11
CR1
R1 12K
−15V
R5 26.1K
+15V
+15V
4
VR1 10V
C1 1UF
+5V
+5V
+5V
1
5
+1.4V
11
14
+1.4V
U1
5
12
MAIN GATE
(91)
1
2
Q1
Q2
Q4
Q5
12
8
+5V
+15V UNREG
P/O P3
3
P/O XA16
+15V UNREG
6
CHOP BLANKING
12
2
6
Q3
−0.3V
−15V
5
−15V
+120V
9
+120V
6
P/O A16
7
3
4
9
10
13
J3
Z-AXIS
(9)
R2 909
CR2
0.4V
−0.6V
CR3
−15V
CW
R4 3480
R6 23.7K
−15V
R3 10K
BEAM INTENSITY
7
12
DLY'D GATE
(8)
3


P/O A15 HVPS
+120V
C2
.056UF
C3
.01UF
R8
7500
R9
1620
C5
.056UF
+102V
Q2
R7
39.2K
Q1
R10
12K
C4
.01UF
15-20V
12
+0.6V
Q4
+1.2V
Q3
R11
3920
R21
220
C6
.02UF
+5V
-15V
TP1
4
R14
120
C11
0.25-1.5
R13
15K
R12
2000
GATE
COMP
ADJ.
C7
150
P1
XA12
NC
9
NC
+120V
8
+120V
+15V
UNREG
2
+15V
UNREG
+15V
3
+15V
-15V
4
-15V
TP2
1
5
6
7
10
3
GATE
OUTPUT
2
-15V
(97)
FLOODGUN
REPELLER
2
R15
1000
+15V
R16
20K
Y ALIGN
(95)
R17
1000
-15V
(0)
L2
Y ALIGN
COIL
2
R18
47K
+120V
(6)
PATTERN
CONTROL
2
R19
39K
C9
.02UF
R20
33K
(7)
COLLECTOR
MESH
2
VR2
51.1V
C10
.02UF
1740A-073-02-07-76
3

PARTS ON THIS SCHEMATIC

P/O A12	P/O A15	CHASSIS
C1-7,9-11 CR1-3 P1 Q1-4 R1-21 S1 TP1 U1 VR1, 2 XA16	XA12	J3 L2

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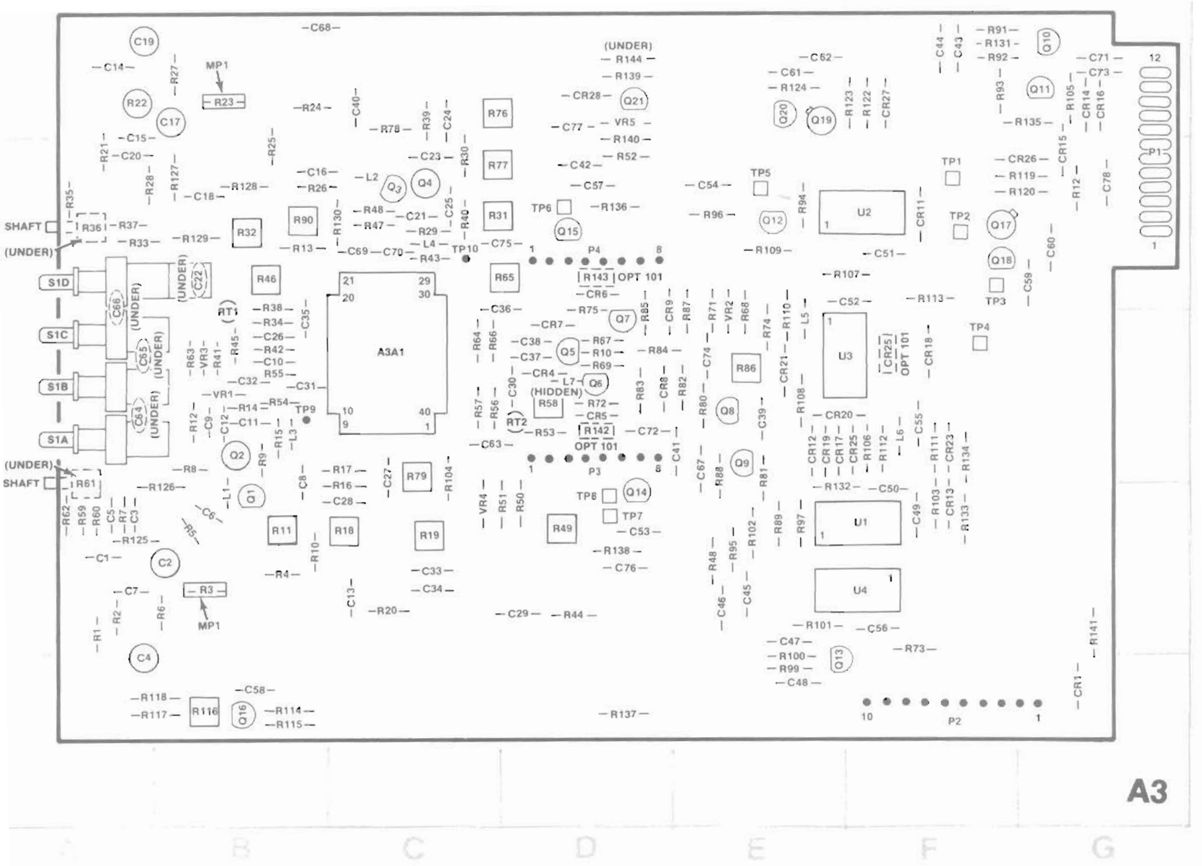
Figure 8-12.
Service Information, Gate Amplifier Assembly A12 (Sheet 2 of 2)



1740A-074-07-76

REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC
A3A1	C-3	C38	D-3	C76	D-4	Q2	B-3	R19	C-4	R57	C-3	R95	E-4	R133	F-4
C1	A-4	C39	E-3	C77	D-1	Q3	C-2	R20	C-4	R58	D-3	R96	E-2	R134	F-3
C2	A-4	C40	C-1	C78	G-2	Q4	C-2	R21	A-2	R59	A-4	R97	E-4	R135	G-1
C3	A-4	C41	D-3	CR1	G-5	Q5	D-3	R22	A-1	R60	A-4	R98	E-4	R136	D-2
C4	A-5	C42	D-2	CR4	D-3	Q6	D-3	R23	B-1	R61	A-3	R99	E-5	R137	D-5
C5	A-4	C43	F-1	CR5	D-3	Q7	D-3	R24	B-1	R62	A-4	R100	E-5	R138	D-4
C6	B-4	C44	F-1	CR6	D-2	Q8	E-3	R25	B-2	R63	B-3	R101	E-4	R139	D-1
C7	A-4	C45	E-4	CR7	D-3	Q9	E-3	R26	B-2	R64	C-3	R102	E-4	R140	D-2
C8	B-3	C46	E-4	CR8	D-3	Q10	G-1	R27	B-1	R65	D-2	R103	F-4	R141	G-4
C9	B-3	C47	E-4	CR9	D-3	Q11	G-1	R28	A-2	R66	C-3	R104	C-3	R142	D-3
C10	B-3	C48	E-5	CR11	F-2	Q12	E-2	R29	C-2	R67	D-3	R105	G-1	R143	D-2
C11	B-3	C49	F-4	CR12	E-3	Q13	E-5	R30	C-2	R68	E-3	R106	F-3	R144	D-1
C12	B-3	C50	F-4	CR13	F-4	Q14	D-4	R31	D-2	R69	D-3	R107	F-2	RT1	B-2
C13	C-4	C51	F-2	CR14	G-1	Q15	D-2	R32	B-2	R70	D-3	R108	E-3	RT2	D-3
C14	A-1	C52	F-2	CR15	G-2	Q16	B-5	R33	A-2	R71	E-3	R109	E-2	S1A	A-3
C15	A11	C53	D-4	CR16	G-1	Q17	F-2	R34	B-3	R72	D-3	R110	E-3	S1B	A-3
C16	B-2	C54	E-2	CR17	E-3	Q18	F-2	R35	A-2	R73	F-4	R111	F-3	S1C	A-3
C17	B-1	C55	F-3	CR18	F-3	Q19	E-1	R36	A-2	R74	E-3	R112	F-3	S1D	A-2
C18	B-2	C56	F-4	CR19	E-3	Q20	E-1	R37	A-2	R75	D-2	R113	F-2	TP1	F-2
C19	A-1	C57	D-2	CR20	E-3	Q21	D-1	R38	B-2	R76	C-1	R114	B-5	TP2	F-2
C20	A-2	C58	B-5	CR21	E-3	R1	A-4	R39	C-1	R77	D-2	R115	B-5	TP3	F-2
C21	C-2	C59	E-2	CR23	F-3	R2	A-4	R40	C-2	R78	C-1	R116	B-5	TP4	F-3
C22	B-2	C60	E-2	CR25	F-3	R3	B-4	R41	B-3	R79	C-3	R117	A-5	TP5	E-2
C23	C-2	C61	E-1	CR26	G-2	R4	B-4	R42	B-3	R80	E-3	R118	A-5	TP6	D-2
C24	C-1	C62	E-1	CR27	F-1	R5	B-4	R43	C-2	R81	E-3	R119	G-2	TP7	D-4
C25	C-2	C63	C-3	CR28	D-1	R6	A-4	R44	D-4	R82	E-3	R120	G-2	TP8	D-4
C26	B-3	C64	A-3	L1	B-4	R7	A-4	R45	B-3	R83	D-3	R121	G-2	TP9	B-3
C27	C-3	C65	A-3	L2	C-2	R8	B-3	R46	B-2	R84	D-3	R122	F-1	TP10	C-2
C28	C-4	C66	A-2	L3	B-3	R9	B-3	R47	C-2	R85	D-3	R123	F-1	U1	F-4
C29	D-4	C67	E-3	L4	C-2	R10	D-3	R48	C-2	R86	E-3	R124	E-1	U2	F-2
C30	D-3	C68	B-1	L5	E-3	R11	B-4	R49	D-4	R87	E-3	R125	A-4	U3	F-3
C31	B-3	C69	C-2	L6	F-3	R12	B-3	R50	D-4	R88	E-3	R126	A-3	U4	F-4
C32	B-3	C70	C-2	L7	D-3	R13	B-2	R51	D-4	R89	E-4	R127	B-2	VR1	B-3
C33	C-4	C71	G-1	P1	G-2	R14	B-3	R52	D-2	R90	B-2	R128	B-2	VR2	E-3
C34	C-4	C72	D-3	P2	F-5	R15	B-3	R53	D-3	R91	F-1	R129	B-2	VR3	B-3
C35	B-3	C73	G-1	P3	D-3	R16	C-3	R54	B-3	R92	F-1	R130	C-2	VR4	C-4
C36	D-2	C74	E-3	P4	D-2	R17	C-3	R55	B-3	R93	F-1	R131	F-1	VR5	D-1
C37	D-3	C75	C-2	Q1	B-4	R18	C-4	R56	C-3	R94	E-2	R132	E-4		

DC VOLTAGE MEASUREMENT CONDITIONS
SCHEMATIC 4

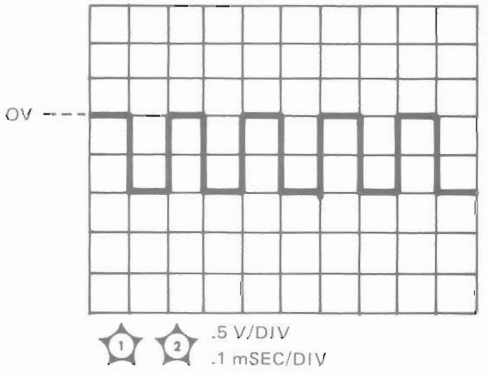
1. Set front-panel controls in accordance with initial control settings in Section V.
2. All voltages are referenced to chassis ground. All indications are nominal and 15% variation from those indicated should be considered normal.

WAVEFORM MEASUREMENT CONDITIONS
SCHEMATIC 4

1. Set front-panel controls in accordance with initial control settings in Section V, except as follows:

Coupling (channel A)	50Ω
TRIGGER LEVEL (main)	stable display

2. Set monitor oscilloscope TIME/DIV and VOLTS/DIV controls as indicated under waveform(s).
3. Connect HP Model 211B Square-wave Generator 50-ohm output to Model 1740A channel A INPUT connector.
4. Adjust square-wave generator output for 6 divisions of signal amplitude (.6 V) at 5 kHz.



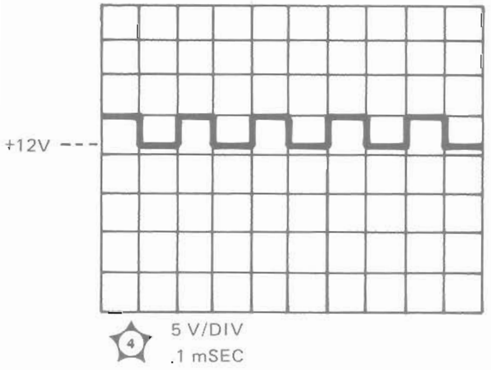
NOTE:

1. OPTION 101: BD. NO. CHANGES TO 01740-66517 AND THE FOLLOWING COMPONENTS ARE DELETED: C77, CR28, 29, Q21, R139 AND R140.

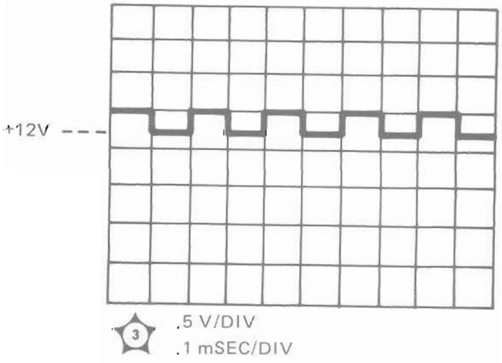
   R142 AND R143 ARE ADDED, AND CR25 IS MOVED TO OPT 101 POSITION.

2. P2 PIN NUMBERS DO NOT AGREE WITH MARKING ON CIRCUIT BD.

   C22, C64, C65 AND C66 ARE LOADED ON BACK.

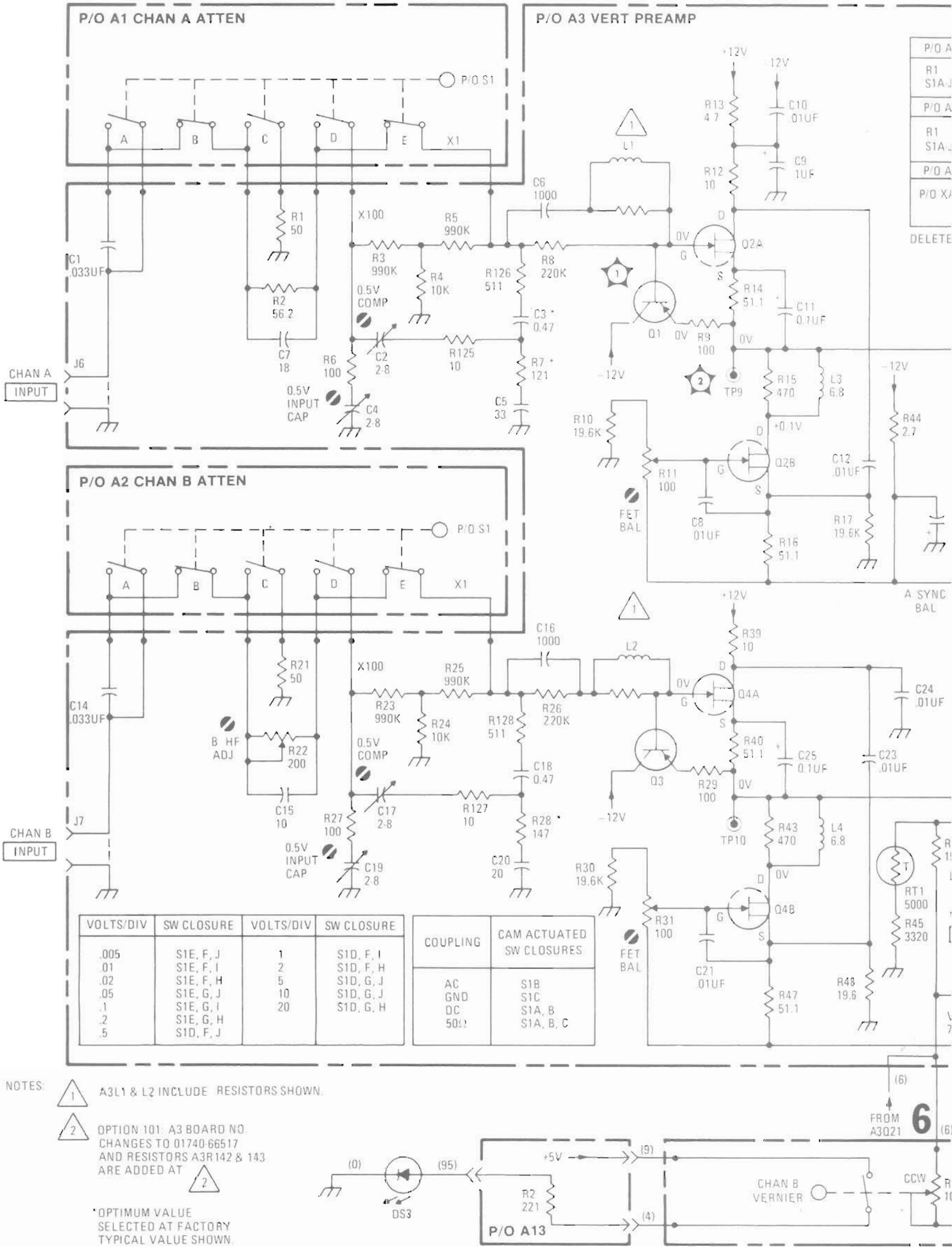


DEPRESS TRIG VIEW



1740A-075-01-10-75

Figure 8-13. Service Information, Vertical Preamplifier Assembly A3 (Sheet 1 of 2)


P/O A1 CHAN A ATTEN
P/O S1
A
B
C
D
E
X1
C1 .033UF
R1 50
R2 56.2
C7 18
X100
R3 990K
R4 10K
R5 990K
0.5V COMP
C2 2-8
R6 100
0.5V INPUT CAP
C4 2-8
R125 10
R126 511
C3* 0.47
R7* 121
C5 33
C6 1000
R8 220K
CHAN A INPUT
J6
P/O A3 VERT PREAMP
+12V
R13 4.7
C10 .01UF
C9 1UF
R12 10
L1
0V
G
D
Q2A
S
R14 51.1
C11 0.1UF
Q1
R9 100
-12V
TP9
R15 470
L3 6.8
+0.1V
R10 19.6K
R11 100
FET BAL
Q2B
C8 .01UF
R16 51.1
C12 .01UF
R17 19.6K
R44 2.7
A SYNC BAL
DELETE
P/O A2 CHAN B ATTEN
P/O S1
C14 .033UF
R21 50
B HF ADJ
R22 200
C15 10
R23 990K
R24 10K
R25 990K
C17 2-8
R27 100
C19 2.8
R127 10
R128 511
C18 0.47
R28* 147
C20 20
C16 1000
L2
R26 220K
CHAN B INPUT
J7
R39 10
Q4A
R40 51.1
C25 0.1UF
C24 .01UF
C23 .01UF
Q3
R29 100
TP10
R43 470
L4 6.8
R30 19.6K
R31 100
Q4B
C21 .01UF
R47 51.1
R48 19.6
RT1 5000
R45 3320
(6)
FROM A3Q21
6
(0)
(95)
DS3
+5V
R2 221
P/O A13
(9)
(4)
CHAN B VERNIER
CCW

VOLTS/DIV	SW CLOSURE	VOLTS/DIV	SW CLOSURE
.005	S1E, F, J	1	S1D, F, I
.01	S1E, F, I	2	S1D, F, H
.02	S1E, F, H	5	S1D, G, J
.05	S1E, G, J	10	S1D, G, J
.1	S1E, G, I	20	S1D, G, H
.2	S1E, G, H		
.5	S1D, F, J		

COUPLING	CAM ACTUATED SW CLOSURES
AC	S1B
GND	S1C
DC	S1A, B
50Ω	S1A, B, C

NOTES:

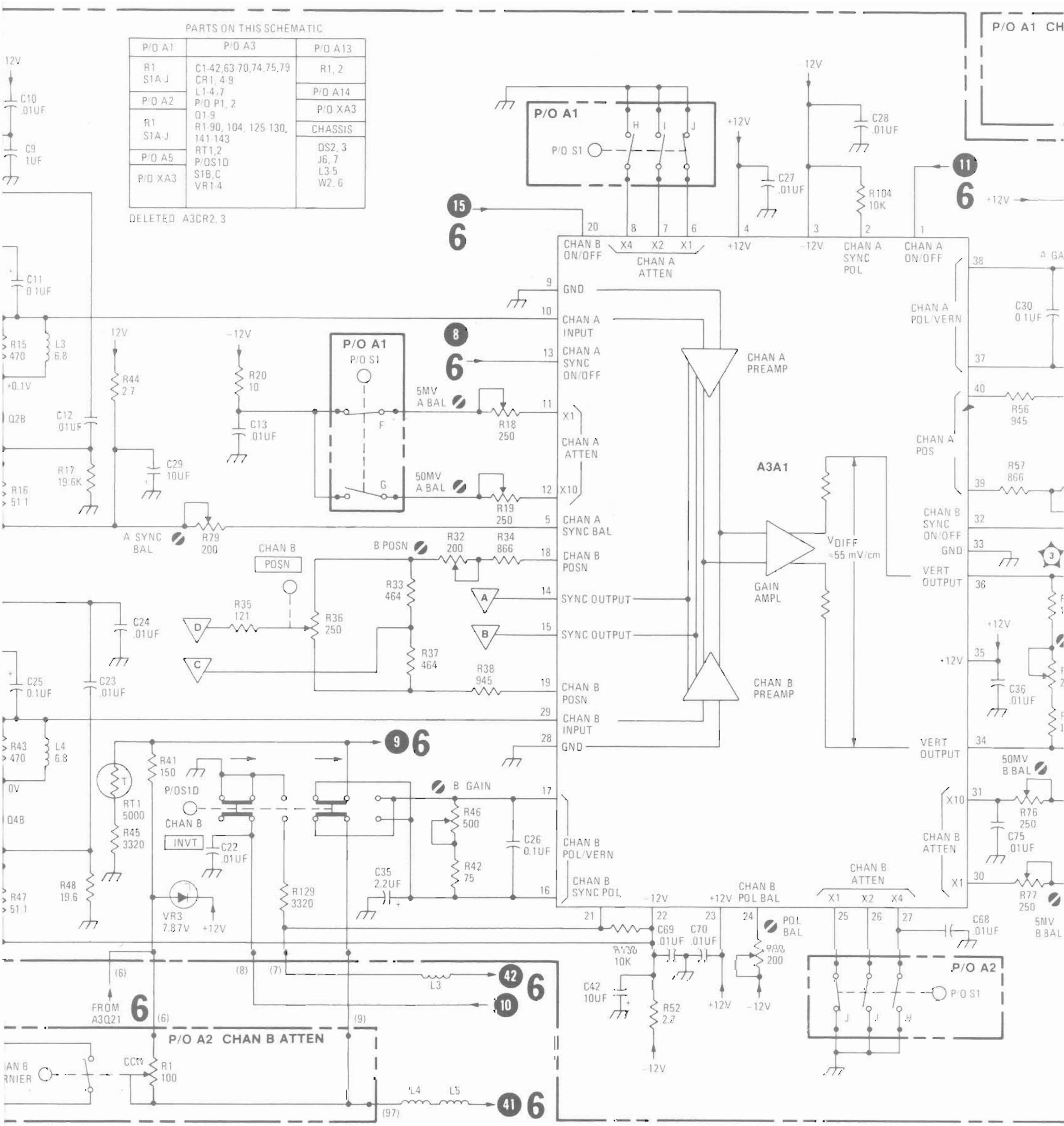
1. A3L1 & L2 INCLUDE RESISTORS SHOWN.
2. OPTION 101: A3 BOARD NO. CHANGES TO 01740-66517 AND RESISTORS A3R142 & 143 ARE ADDED AT 2

*OPTIMUM VALUE SELECTED AT FACTORY. TYPICAL VALUE SHOWN.

PARTS ON THIS SCHEMATIC

P/O A1	P/O A3	P/O A13
R1 S1A-J	C1-42,63-70,74,75,79 CR1, 4-9 L1-4,7 P/O P1, 2 Q1-9 R1-90, 104, 125-130, 141-143 RT1,2 P/OS1D S1B,C VR1-4	R1, 2
P/O A2		P/O A14
R1 S1A-J		P/O XA3
P/O A5		CHASSIS
P/O XA3		DS2, 3 J6, 7 L3-5 W2, 6

DELETED A3CR2, 3



A3A1
P/O A1
P/O S1
P/O A1 CH
P/O A2
P/O S1
P/O A2 CHAN B ATTEN
CHAN B VERNIER
CHAN B ON/OFF
CHAN A ATTEN
CHAN A SYNC POL
CHAN A ON/OFF
CHAN A INPUT
CHAN A SYNC ON/OFF
CHAN A PREAMP
CHAN B PREAMP
GAIN AMPL
VDIFF ≈55 mV/cm
VERT OUTPUT
CHAN A POL/VERN
CHAN A POS
CHAN B SYNC ON/OFF
CHAN A SYNC BAL
CHAN B POSN
SYNC OUTPUT
CHAN B INPUT
CHAN B POL/VERN
CHAN B SYNC POL
CHAN B POL BAL
CHAN B ATTEN
GND
X1 X2 X4 X10
5MV A BAL
50MV A BAL
A SYNC BAL
B POSN
B GAIN
POL BAL
50MV B BAL
5MV B BAL
CHAN B POSN
CHAN B INVT
P/OS1D
FROM A3Q21
R15 470
L3 6.8
R44 2.7
R20 10
C13 .01UF
R18 250
R19 250
R79 200
R32 200
R34 866
R33 464
R35 121
R36 250
R37 464
R38 945
R56 945
R57 866
R104 10K
C28 .01UF
C27 .01UF
C10 .01UF
C9 1UF
C11 0.1UF
C12 .01UF
C29 10UF
R17 19.6K
R16 51.1
C24 .01UF
C25 0.1UF
C23 .01UF
R43 470
L4 6.8
R41 150
RT1 5000
R45 3320
C22 .01UF
VR3 7.87V
R48 19.6
R47 51.1
R129 3320
R46 500
R42 75
C35 2.2UF
C26 0.1UF
C30 0.1UF
C36 .01UF
R76 250
C75 .01UF
R77 250
C68 .01UF
R130 10K
C69 .01UF
C70 .01UF
R90 200
C42 10UF
R52 2.2
R1 100
CCW
L3
L4 L5
+12V
-12V
+0.1V
0V
Q2B
Q4B
(6) (8) (7) (9) (97)
15 6
11 6
8 6
9 6
42 6
10 6
41 6

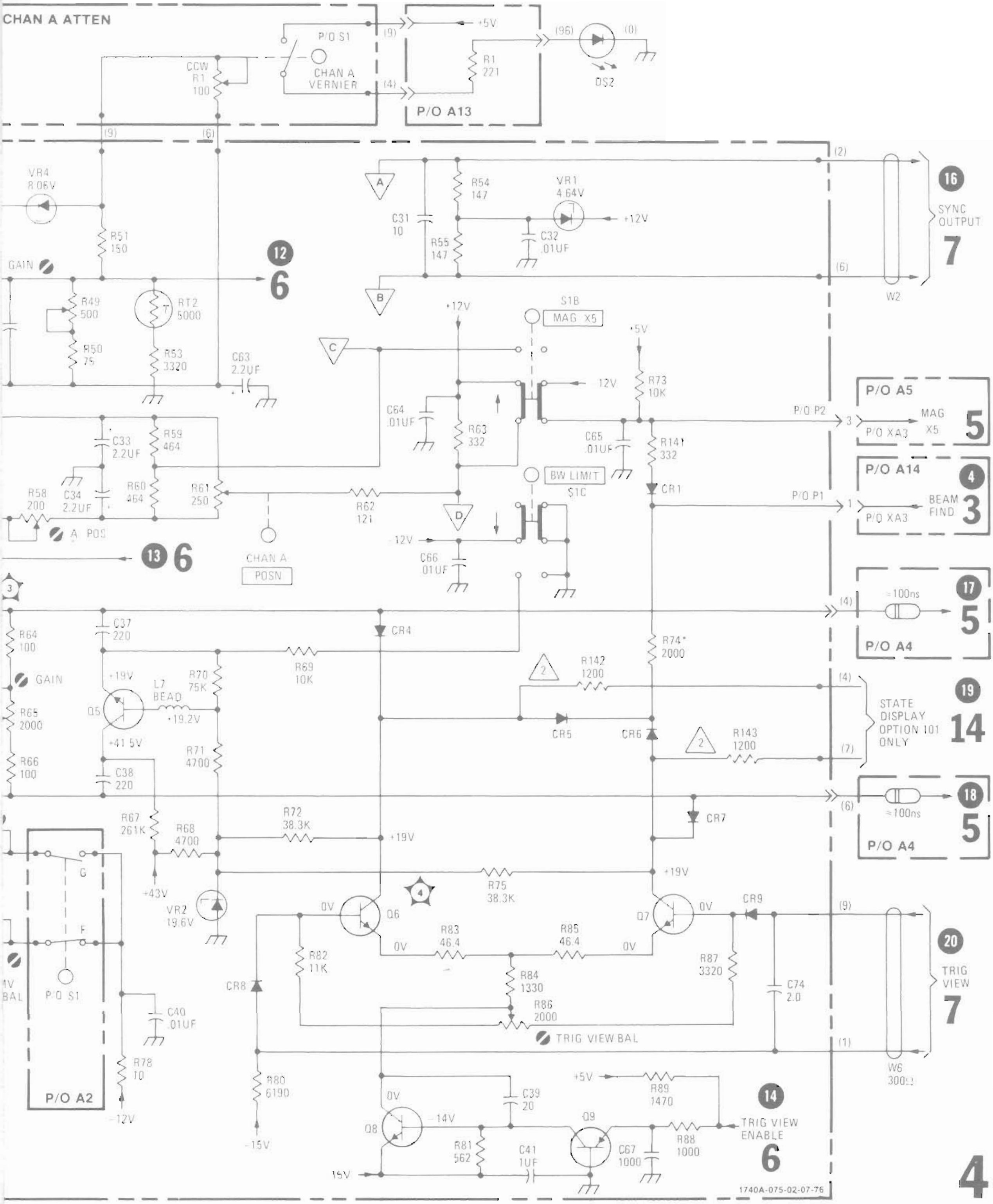
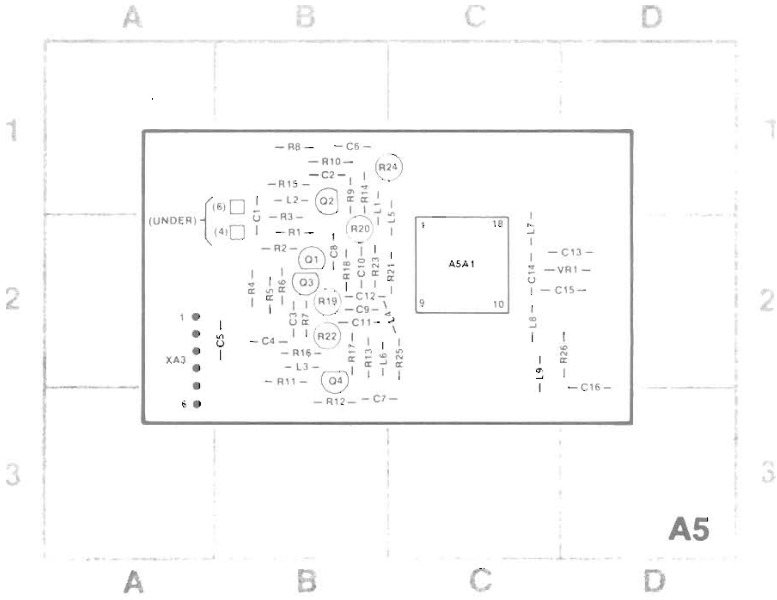

CHAN A ATTEN
P/O S1
CHAN A VERNIER
CCW
R1 100
(9)
(4)
+5V
R1 221
P/O A13
(96)
(0)
DS2
(9)
(6)
VR4 8.06V
R51 150
GAIN
R49 500
R50 75
RT2 5000
R53 3320
C63 2.2UF
12
6
A
B
C
D
C31 10
R54 147
R55 147
VR1 4.64V
+12V
C32 .01UF
(2)
(6)
W2
16
SYNC OUTPUT
7
S1B
MAG X5
+12V
+5V
-12V
C64 .01UF
R63 332
R73 10K
C65 .01UF
R141 332
CR1
P/O P2
P/O A5
MAG X5
P/O XA3
5
C33 2.2UF
C34 2.2UF
R58 200
R59 464
R60 464
R61 250
R62 121
A POS
BW LIMIT
S1C
-12V
C66 .01UF
P/O P1
P/O A14
4
BEAM FIND
P/O XA3
3
13
6
CHAN A
POSN
3
R64 100
GAIN
R65 2000
R66 100
C37 220
C38 220
+19V
Q5
L7 BEAD
+19.2V
+41.5V
R70 75K
R71 4700
R69 10K
CR4
2
R142 1200
CR5
CR6
R74* 2000
R143 1200
(4)
≈100ns
17
5
P/O A4
(4)
(7)
19
STATE DISPLAY OPTION 101 ONLY
14
(6)
≈100ns
18
5
P/O A4
R67 261K
R68 4700
+43V
VR2 19.6V
R72 38.3K
+19V
CR7
+19V
G
F
P/O S1
MV BAL
R75 38.3K
4
0V
Q6
0V
R83 46.4
R85 46.4
0V
Q7
0V
CR9
(9)
R82 11K
R84 1330
R86 2000
R87 3320
C74 2.0
20
TRIG VIEW
7
CR8
TRIG VIEW BAL
(1)
W6 300Ω
C40 .01UF
R78 10
-12V
P/O A2
R80 6190
-15V
0V
Q8
-14V
C39 20
+5V
R89 1470
Q9
R88 1000
TRIG VIEW ENABLE
6
14
R81 562
C41 1UF
C67 1000
15V
1740A-075-02-07-76
4

Figure 8-13.
Service Information, Vertical Preamplifier Assembly A3 (Sheet 2 of 2)


A
B
C
D
1
2
3
R8
C6
R10
R24
C2
R15
L2
Q2
R9
R14
L1
L5
(UNDER)
(6)
(4)
C1
R3
R1
R20
R2
Q1
C8
R18
C10
R23
R21
A5A1
1
18
9
10
L7
C13
C14
VR1
C15
R4
R5
R6
Q3
R19
C12
C9
L4
C3
R7
C11
1
XA3
6
C5
C4
R22
R16
L3
R11
Q4
R17
R13
L6
R25
R12
C7
L8
L9
R26
C16
A5

1740A-076-10-75

REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC
A5A1	C-2	C10	B-2	L4	C-2	R1	B-2	R11	B-2	R21	C-2
C1	B-1	C11	B-2	L5	C-2	R2	B-2	R12	B-3	R22	B-2
C2	B-1	C12	B-2	L6	B-2	R3	B-2	R13	B-2	R23	B-2
C3	B-2	C13	D-2	L7	C-2	R4	B-2	R14	B-1	R24	B-1
C4	B-2	C14	C-2	L8	C-2	R5	B-2	R15	B-1	R25	C-2
C5	B-2	C15	D-2	L9	C-2	R6	B-2	R16	B-2	R26	D-2
C6	B-1	C16	D-2	Q1	B-2	R7	B-2	R17	B-2	VR1	D-2
C7	B-3	L1	B-1	Q2	B-1	R8	B-1	R18	B-2	XA3	A-2
C8	B-2	L2	B-1	Q3	B-2	R9	B-1	R19	B-2		
C9	B-2	L3	B-2	Q4	B-2	R10	B-1	R20	B-2		

DC VOLTAGE MEASUREMENT CONDITIONS
SCHEMATIC 5

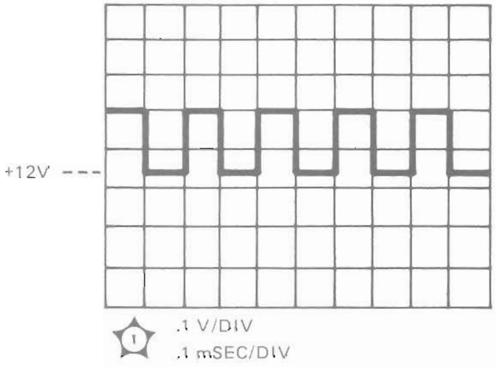
1. Set front-panel controls in accordance with initial control settings in Section V.
2. All voltages are referenced to chassis ground. All indications are nominal and 15% variation from those indicated should be considered normal.

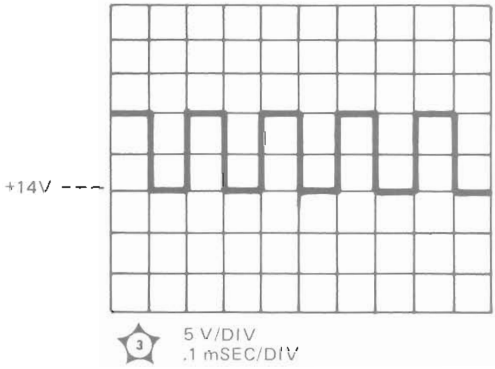
WAVEFORM MEASUREMENT CONDITIONS
SCHEMATIC 5

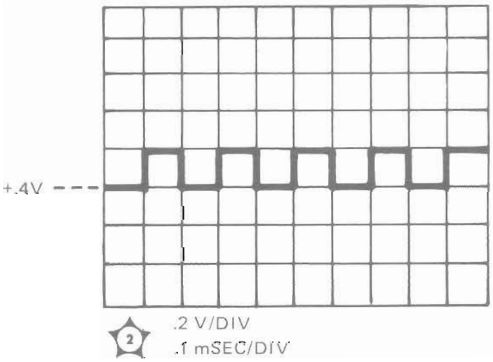
1. Set front-panel controls in accordance with initial control settings in Section V, except as follows:

   Coupling (channel A) 50Ω

2. Set monitor oscilloscope TIME/DIV and VOLTS/DIV controls as indicated under waveform(s).
3. Connect HP Model 211B Square-wave Generator 50-ohm output to Model 1740A channel A INPUT connector.
4. Adjust square-wave generator output for 6 divisions of signal amplitude (.6 V) at 5 kHz.

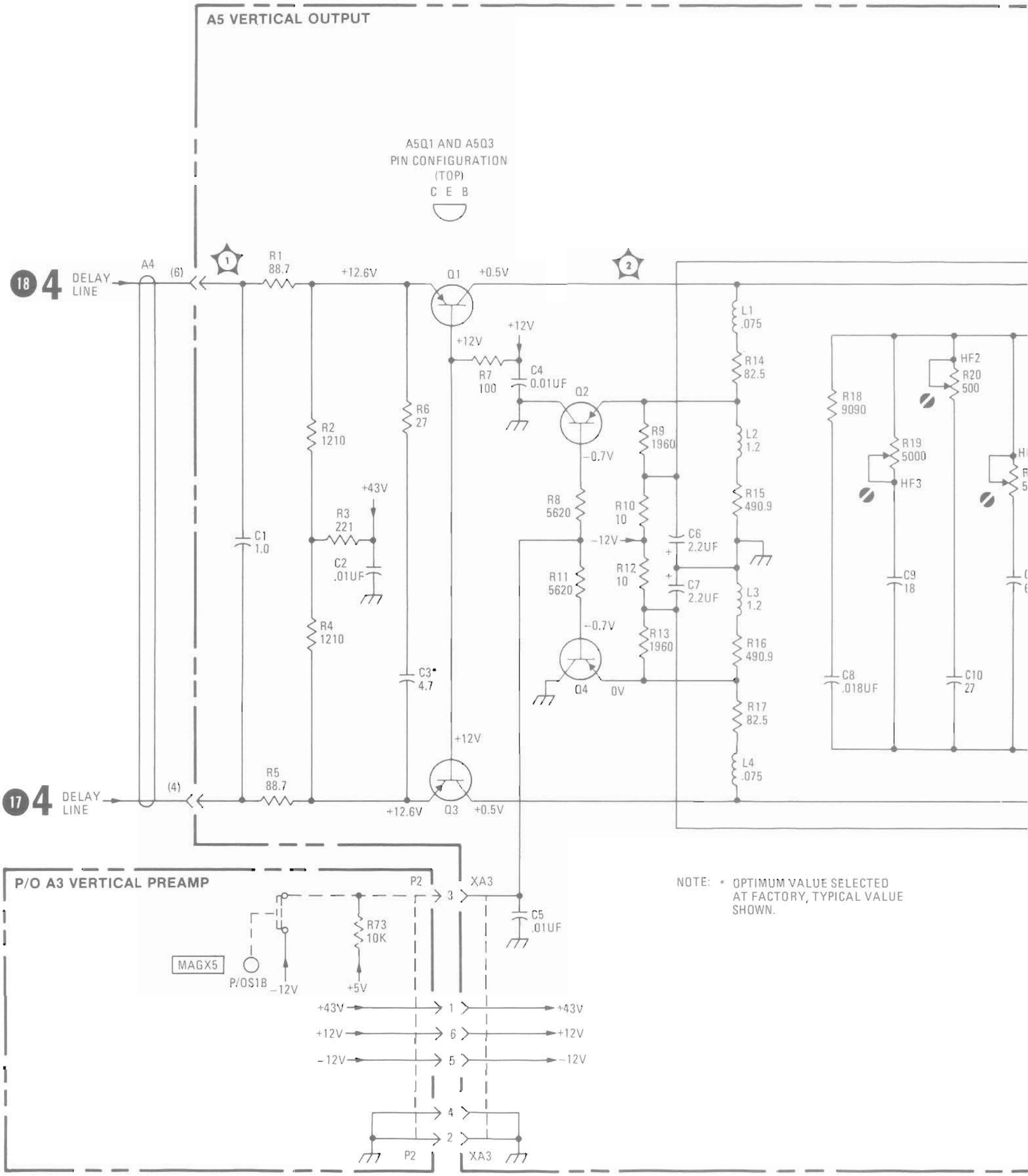




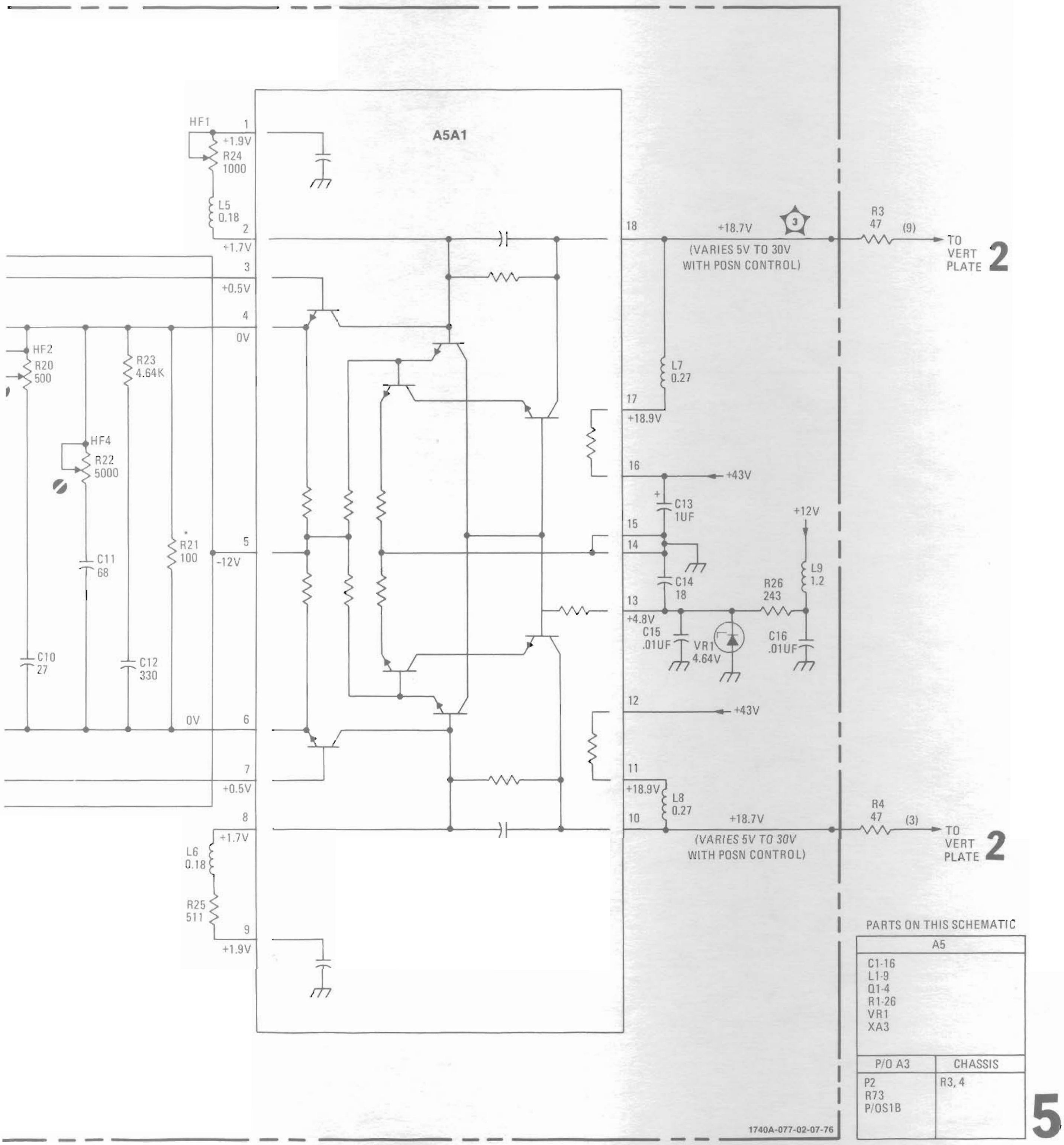


1740A-077-01-10-75

Figure 8-14. Service Information, Vertical Output Assembly A5 (Sheet 1 of 2)


A5 VERTICAL OUTPUT
A5Q1 AND A5Q3
PIN CONFIGURATION
(TOP)
C E B
18 4 DELAY LINE
17 4 DELAY LINE
A4
(6)
(4)
1
2
R1
88.7
+12.6V
Q1
+0.5V
+12V
+12V
R7
100
C4
0.01UF
Q2
L1
.075
R14
82.5
R18
9090
HF2
R20
500
R19
5000
HF3
R6
27
R2
1210
R9
1960
-0.7V
L2
1.2
+43V
R3
221
R8
5620
R10
10
R15
490.9
C1
1.0
-12V
C6
2.2UF
C2
.01UF
R11
5620
R12
10
C7
2.2UF
L3
1.2
C9
18
R4
1210
-0.7V
R13
1960
R16
490.9
C3*
4.7
Q4
0V
C8
.018UF
C10
27
R17
82.5
+12V
L4
.075
R5
88.7
+12.6V
Q3
+0.5V
P/O A3 VERTICAL PREAMP
P2
XA3
3
C5
.01UF
R73
10K
MAGX5
P/OS1B
-12V
+5V
+43V
1
+43V
+12V
6
+12V
-12V
5
-12V
4
2
P2
XA3

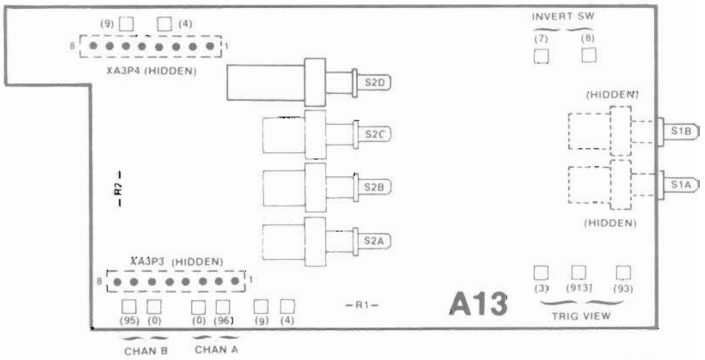
NOTE: * OPTIMUM VALUE SELECTED AT FACTORY, TYPICAL VALUE SHOWN.


A5A1
HF1
R24
1000
+1.9V
1
L5
0.18
2
+1.7V
3
+0.5V
4
0V
HF2
R20
500
R23
4.64K
HF4
R22
5000
C11
68
*
R21
100
5
-12V
C10
27
C12
330
0V
6
7
+0.5V
8
+1.7V
L6
0.18
R25
511
9
+1.9V
18
+18.7V
3
(VARIES 5V TO 30V
WITH POSN CONTROL)
R3
47
(9)
TO
VERT
PLATE
2
L7
0.27
17
+18.9V
16
+43V
C13
1UF
15
14
+12V
L9
1.2
C14
18
R26
243
13
+4.8V
C15
.01UF
VR1
4.64V
C16
.01UF
12
+43V
11
+18.9V
L8
0.27
10
+18.7V
(VARIES 5V TO 30V
WITH POSN CONTROL)
R4
47
(3)
TO
VERT
PLATE
2
1740A-077-02-07-76
5

PARTS ON THIS SCHEMATIC

A5	
C1-16 L1-9 Q1-4 R1-26 VR1 XA3	
P/O A3	**CHASSIS**
P2 R73 P/OS1B	R3, 4

Figure 8-14.
Service Information, Vertical Output Assembly A5 (Sheet 2 of 2)


(9)
(4)
8
1
XA3P4 (HIDDEN)
INVERT SW
(7)
(8)
S2D
(HIDDEN)
S1B
S2C
R2
S2B
S1A
(HIDDEN)
S2A
XA3P3 (HIDDEN)
8
1
(3)
(913)
(93)
R1
A13
TRIG VIEW
(95)
(0)
(0)
(96)
(9)
(4)
CHAN B
CHAN A

1740A-078-10-75

NOTE
See Figure 8-13
for Assembly A3
Component Identification

DC VOLTAGE MEASUREMENT CONDITIONS
SCHEMATIC 6

1. Set front-panel controls in accordance with initial control settings in Section V.
2. All voltages are referenced to chassis ground. All indications are nominal and 15% variation from those indicated should be considered normal.

WAVEFORM MEASUREMENT CONDITIONS
SCHEMATIC 6

1. Set front-panel controls in accordance with initial control settings in Section V, except as follows:

Coupling (channel A)	50Ω
TRIGGER LEVEL (main)	stable display
DISPLAY	ALT
TRIG VIEW	engaged

2. Set monitor oscilloscope TIME/DIV and VOLTS/DIV controls as indicated under waveform(s).
3. Connect HP Model 211B Square-wave Generator 50-ohm output to Model 1740A channel A INPUT connector.
4. Adjust square-wave generator output for 6 divisions of signal amplitude (.6V) at 5 kHz.

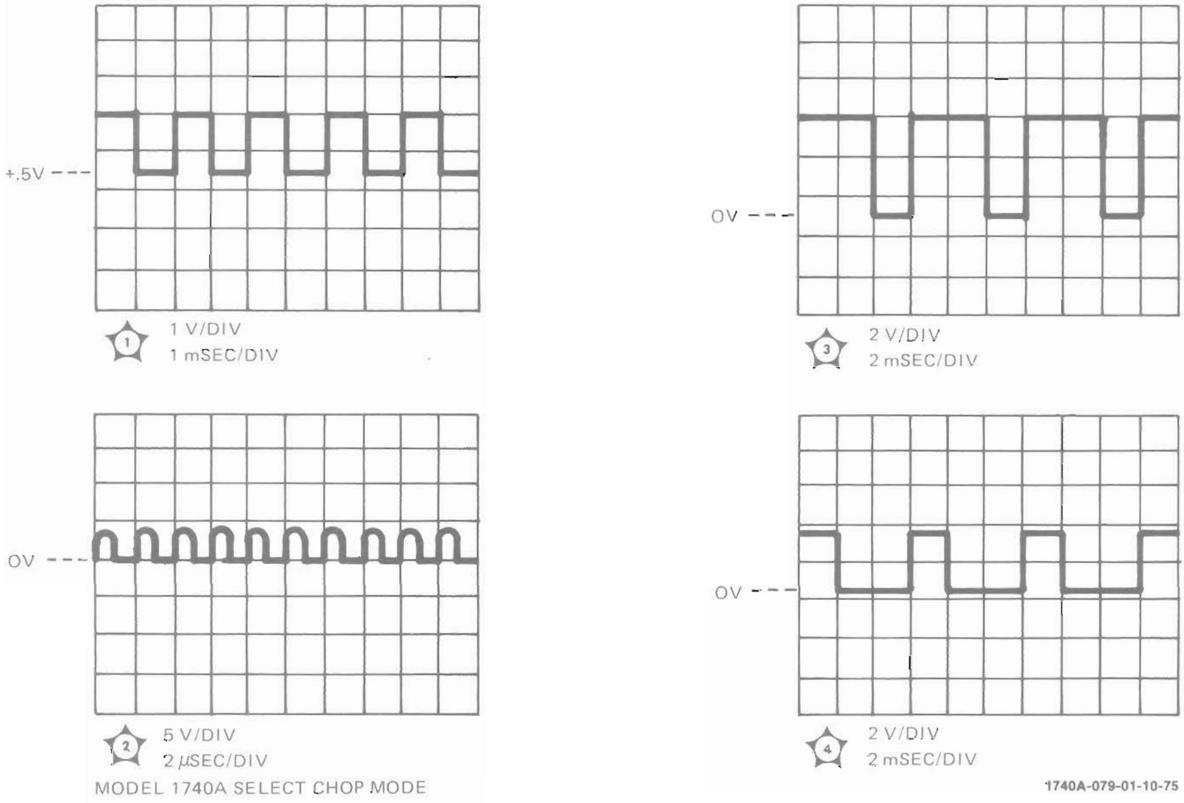
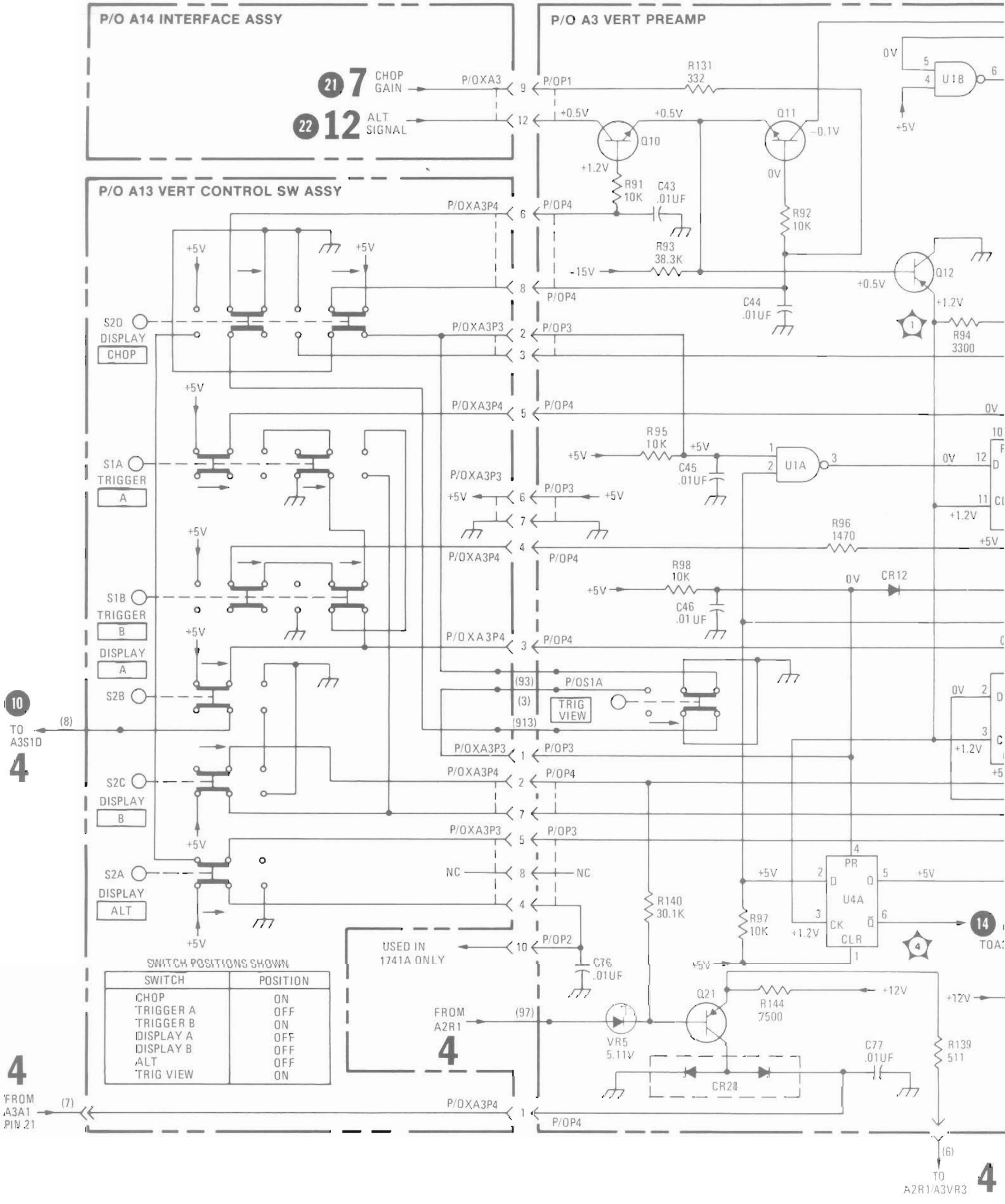
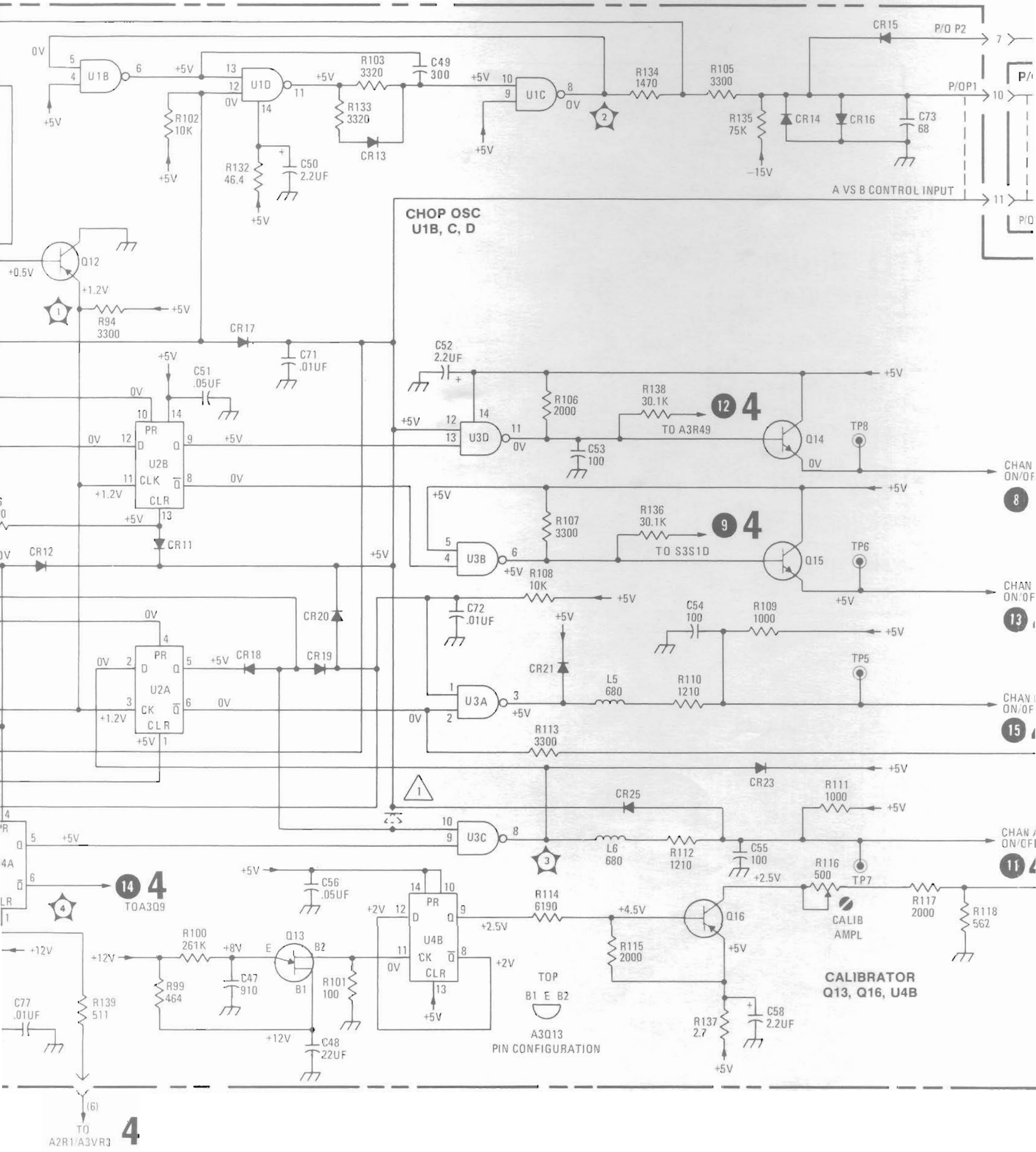


Figure 8-15. Service Information, Vertical Control Switching Assembly A13 and Vertical Preamplifier Assembly A3 (Sheet 1 of 2)

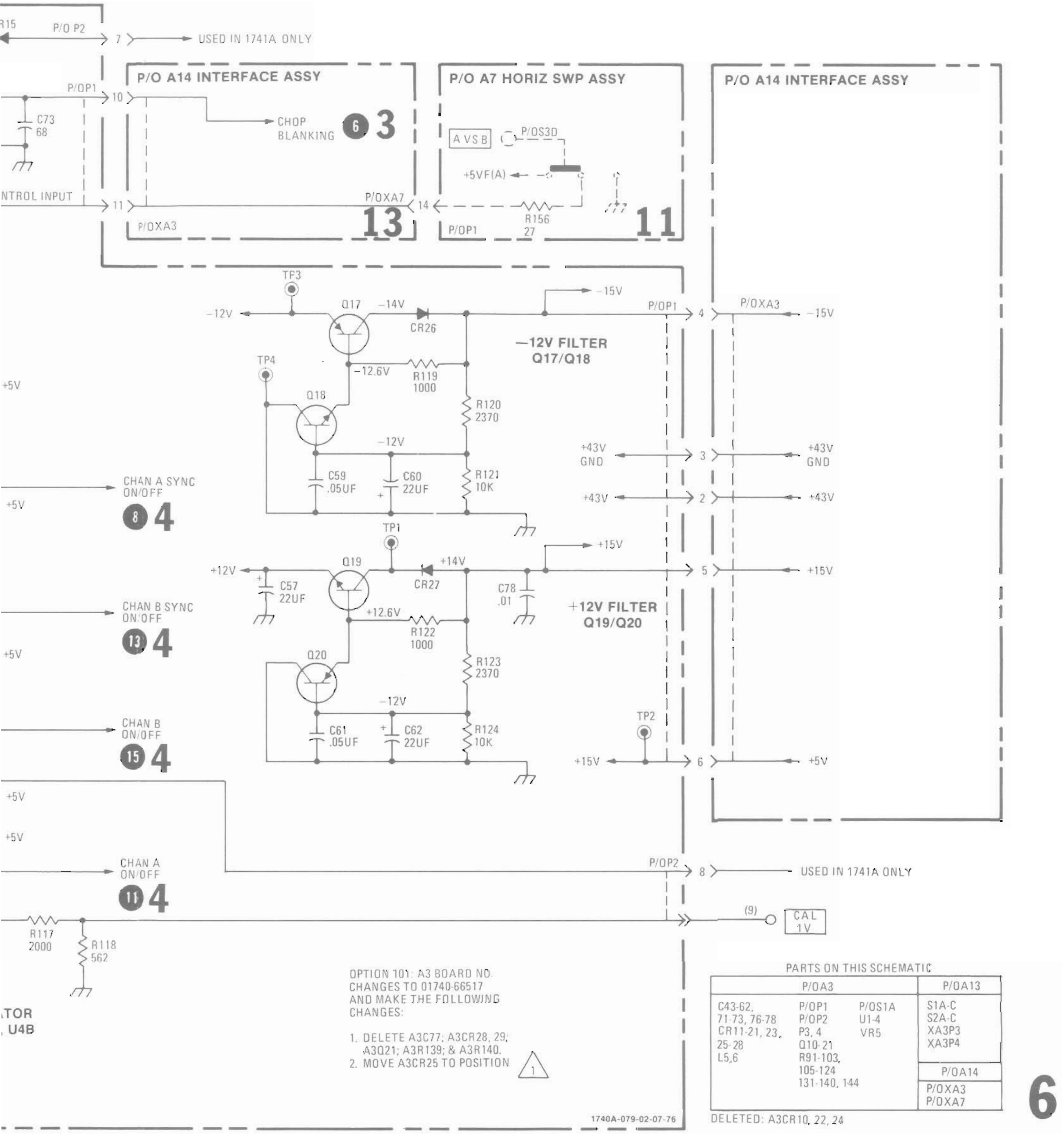

P/O A14 INTERFACE ASSY
21
7
CHOP GAIN
22
12
ALT SIGNAL
P/OXA3
P/O A3 VERT PREAMP
P/OP1
R131 332
+0.5V
Q10
+1.2V
R91 10K
C43 .01UF
Q11
-0.1V
0V
R92 10K
U1B
+5V
P/O A13 VERT CONTROL SW ASSY
P/OXA3P4
P/OP4
R93 38.3K
-15V
Q12
+0.5V
+1.2V
C44 .01UF
R94 3300
S2D
DISPLAY
CHOP
P/OXA3P3
P/OP3
S1A
TRIGGER
A
R95 10K
C45 .01UF
U1A
S1B
TRIGGER
B
DISPLAY
A
R96 1470
R98 10K
C46 .01UF
CR12
10
TO A3S1D
4
(8)
S2B
(93)
(3)
(913)
P/OS1A
TRIG VIEW
S2C
DISPLAY
B
S2A
DISPLAY
ALT
NC
R140 30.1K
R97 10K
U4A
PR
CK
CLR
14
TOA
USED IN 1741A ONLY
P/OP2
C76 .01UF
FROM A2R1
4
(97)
VR5 5.11V
Q21
R144 7500
+12V
CR28
C77 .01UF
R139 511
4
FROM A3A1 PIN 21
(7)
(6)
TO A2R1/A3VR3
4

SWITCH POSITIONS SHOWN

SWITCH	POSITION
CHOP	ON
TRIGGER A	OFF
TRIGGER B	ON
DISPLAY A	OFF
DISPLAY B	OFF
ALT	OFF
TRIG VIEW	ON



CHOP OSC
U1B, C, D
CALIBRATOR
Q13, Q16, U4B
U1B
U1D
U1C
U2B
U2A
U3D
U3B
U3A
U3C
U4A
U4B
Q12
Q13
Q14
Q15
Q16
R94 3300
R99 464
R100 261K
R101 100
R102 10K
R103 3320
R105 3300
R106 2000
R107 3300
R108 10K
R109 1000
R110 1210
R111 1000
R112 1210
R113 3300
R114 6190
R115 2000
R116 500
R117 2000
R118 562
R132 46.4
R133 3320
R134 1470
R135 75K
R136 30.1K
R137 2.7
R138 30.1K
R139 511
C47 910
C48 22UF
C49 300
C50 2.2UF
C51 .05UF
C52 2.2UF
C53 100
C54 100
C55 100
C56 .05UF
C58 2.2UF
C71 .01UF
C72 .01UF
C73 68
C77 .01UF
L5 680
L6 680
CR11
CR12
CR13
CR14
CR15
CR16
CR17
CR18
CR19
CR20
CR21
CR23
CR25
TP5
TP6
TP7
TP8
P/O P2
P/OP1
A VS B CONTROL INPUT
TO A3R49
TO S3S1D
TOA3Q09
TO A2R1/A3VR3
CALIB AMPL
TOP
B1 E B2
A3Q13 PIN CONFIGURATION
CHAN ON/OF
12 4
9 4
14 4
4
8
13
15
11
1
2
3
4
+5V
0V
+12V
-15V
+0.5V
+1.2V
+2V
+2.5V
+4.5V
+8V


P/O P2
7
USED IN 1741A ONLY
P/O A14 INTERFACE ASSY
P/OP1
10
C73
68
CHOP
BLANKING
6 3
NTROL INPUT
11
P/OXA3
P/OXA7
13
14
P/O A7 HORIZ SWP ASSY
A VS B
P/OS3D
+5VF(A)
R156
27
P/OP1
11
P/O A14 INTERFACE ASSY
TP3
-12V
Q17
-14V
CR26
-15V
P/OP1
4
P/OXA3
-15V
-12V FILTER
Q17/Q18
TP4
-12.6V
R119
1000
Q18
R120
2370
+5V
-12V
+43V
GND
3
+43V
GND
C59
.05UF
C60
22UF
R121
10K
+43V
2
+43V
CHAN A SYNC
ON/OFF
8 4
+5V
TP1
+15V
+12V
C57
22UF
Q19
+14V
CR27
C78
.01
5
+15V
+12V FILTER
Q19/Q20
CHAN B SYNC
ON/OFF
13 4
+12.6V
R122
1000
+5V
Q20
R123
2370
-12V
TP2
CHAN B
ON/OFF
15 4
C61
.05UF
C62
22UF
R124
10K
+15V
6
+5V
+5V
+5V
CHAN A
ON/OFF
11 4
P/OP2
8
USED IN 1741A ONLY
(9)
CAL
1V
R117
2000
R118
562
TOR
, U4B
1
1740A-079-02-07-76
6

OPTION 101: A3 BOARD NO. CHANGES TO 01740-66517 AND MAKE THE FOLLOWING CHANGES:

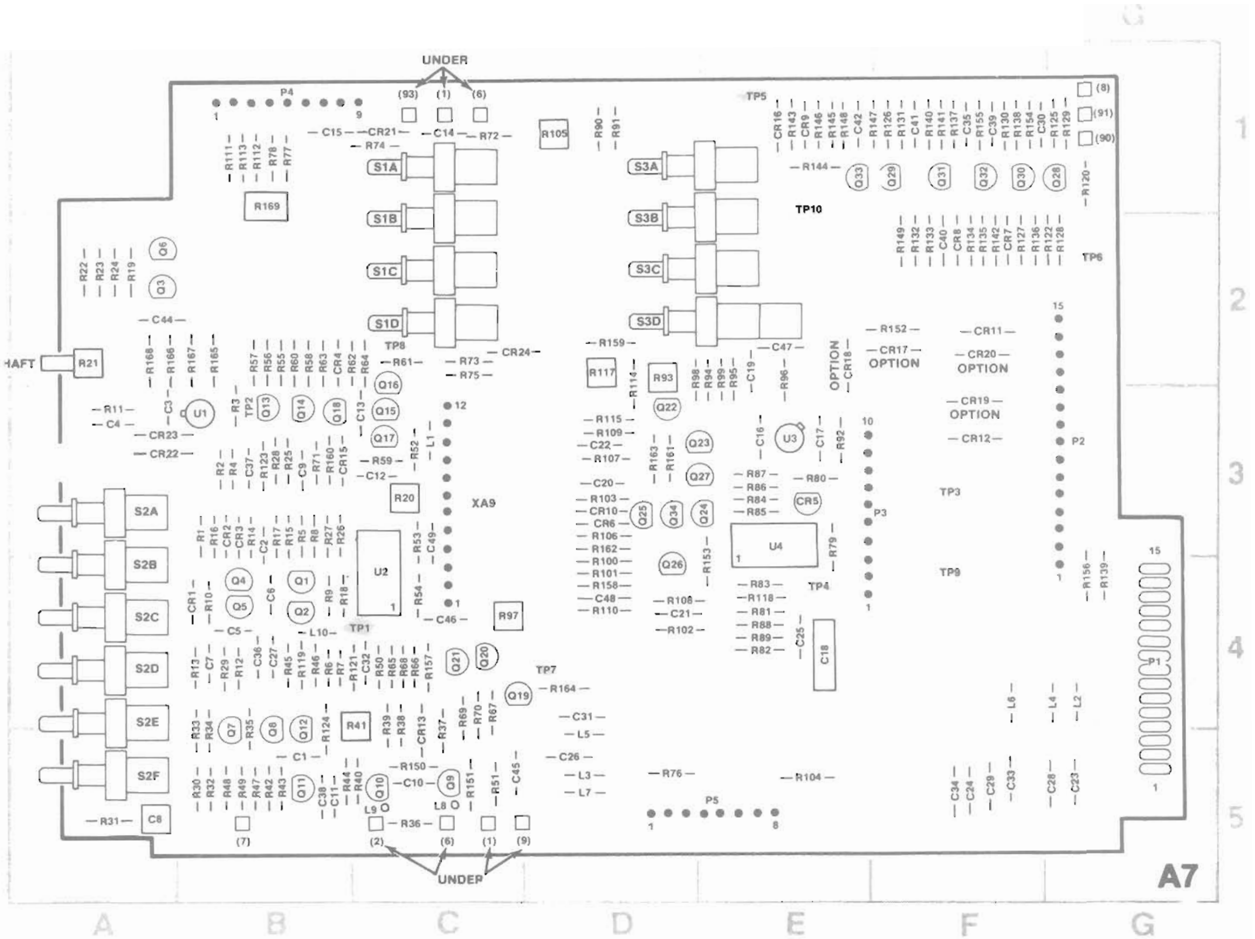
1. DELETE A3C77; A3CR28, 29; A3Q21; A3R139; & A3R140.
2. MOVE A3CR25 TO POSITION △1

PARTS ON THIS SCHEMATIC

P/OA3			P/OA13
C43-62, 71-73, 76-78 CR11-21, 23, 25-28 L5,6	P/OP1 P/OP2 P3, 4 Q10-21 R91-103, 105-124 131-140, 144	P/OS1A U1-4 VR5	S1A-C S2A-C XA3P3 XA3P4
			P/OA14
			P/OXA3 P/OXA7

DELETED: A3CR10, 22, 24

Figure 8-15.
Service Information, Vertical Control Switching Assembly A13 and Vertical Preamplifier Assembly A3 (Sheet 2 of 2)



1740A-080-07-76

REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC
C1	B-5	C41	F-1	L10	B-4	R1	R-2	R41	C-4	R80	E-3	R120	G-1	R159	D-2
C2	B-3	C42	E-1	P2	G-3	R2	B-3	R42	B-5	R81	E-4	R121	C-4	R160	B-3
C3	A-3	C44	A-2	P3	F-3	R3	B-3	R43	B-5	R82	E-4	R122	F-2	R161	D-3
C4	A-3	C45	C-5	P4	B-1	R4	B-3	R44	B-5	R83	E-4	R123	B-3	R162	D-3
C5	B-4	C46	C-4	P5	E-5	R5	B-3	R45	B-4	R84	E-3	R124	B-4	R163	D-3
C6	B-4	C47	E-2	Q1	B-4	R6	B-4	R46	B-4	R85	E-3	R125	G-1	R164	D-4
C7	B-4	C48	D-4	Q2	B-4	R7	B-4	R47	B-5	R86	E-3	R126	F-1	R165	B-2
C8	A-5	C49	C-3	Q3	A-2	R8	B-3	R48	B-5	R87	E-3	R127	F-2	R166	A-2
C9	B-3	CR1	B-4	Q4	B-4	R9	B-4	R49	B-5	R88	E-4	R128	F-2	R167	B-2
C10	C-5	CR2	B-3	Q5	B-4	R10	B-4	R50	C-4	R89	E-4	R129	G-1	R168	A-2
C11	B-5	CR3	B-3	Q6	A-2	R11	A-3	R51	C-5	R90	D-1	R130	F-1	R169	B-1
C12	C-3	CR4	B-2	Q7	B-5	R12	B-4	R52	C-3	R91	D-1	R131	F-1	S1A	C-1
C13	C-3	CR5	E-3	Q8	B-5	R13	B-4	R53	C-3	R92	E-3	R132	F-2	S1B	C-2
C14	C-1	CR6	D-3	Q9	C-5	R14	B-3	R54	C-4	R93	D-2	R133	F-2	S1C	C-2
C15	B-1	CR7	F-2	Q10	C-5	R15	B-3	R55	B-2	R94	E-2	R134	F-2	S1D	C-2
C16	E-3	CR8	F-2	Q11	B-5	R16	B-3	R56	B-2	R95	E-2	R135	F-2	S2A	A-3
C17	E-3	CR9	E-1	Q12	B-5	R17	B-3	R57	B-2	R96	E-2	R136	F-2	S2B	A-4
C18	E-4	CR10	D-3	Q13	B-3	R18	B-4	R58	B-2	R97	C-4	R137	F-1	S2C	A-4
C19	E-2	CR11	F-2	Q14	B-3	R19	A-2	R59	C-3	R98	D-2	R138	F-1	S2D	A-4
C20	D-3	CR12	F-3	Q15	C-3	R20	C-3	R60	B-2	R99	E-2	R139	G-4	S2E	A-4
C21	D-4	CR13	C-4	Q16	C-2	R21	A-2	R61	C-2	R100	D-4	R140	F-1	S2F	A-5
C22	D-3	CR15	B-3	Q17	C-3	R22	A-2	R62	B-2	R101	D-4	R141	F-1	S3A	D-1
C23	G-5	CR16	E-1	Q18	B-3	R23	A-2	R63	B-2	R102	D-4	R142	F-2	S3B	D-2
C24	F-5	CR17	F-2	Q19	C-4	R24	A-2	R64	C-2	R103	D-3	R143	E-1	S3C	D-2
C25	E-4	CR18	E-2	Q20	C-4	R25	B-3	R65	C-4	R104	E-5	R144	E-1	S3D	D-2
C26	D-5	CR19	F-3	Q21	C-4	R26	B-3	R66	C-4	R105	D-1	R145	E-1	TP1	C-4
C27	B-4	CR20	F-2	Q22	D-3	R27	B-3	R67	C-4	R106	D-3	R146	E-1	TP2	B-3
C28	G-5	CR21	C-1	Q23	E-3	R28	B-3	R68	C-4	R107	D-3	R147	E-1	TP3	F-3
C29	F-5	CR22	A-3	Q24	E-3	R29	B-4	R69	C-4	R108	D-4	R148	E-1	TP4	E-4
C30	F-1	CR23	A-3	Q25	D-3	R30	B-5	R70	C-4	R109	D-3	R149	F-2	TP5	E-1
C31	D-4	CR24	C-2	Q26	D-4	R31	A-5	R71	B-3	R110	D-4	R150	C-5	TP6	G-2
C32	C-4	L1	C-3	Q27	E-3	R32	B-5	R72	C-1	R111	B-1	R151	C-5	TP7	D-4
C33	F-5	L2	G-4	Q28	G-1	R33	B-5	R73	C-2	R112	B-1	R152	F-2	TP8	C-2
C34	F-5	L3	D-5	Q29	F-1	R34	B-5	R74	C-1	R113	B-1	R153	E-4	TP9	F-4
C35	F-1	L4	G-4	Q30	F-1	R35	B-5	R75	C-2	R114	D-2	R154	F-1	TP10	E-1
C36	B-4	L5	D-5	Q31	F-1	R36	C-5	R76	D-5	R115	D-3	R155	F-1	U1	B-3
C37	B-3	L6	F-4	Q32	F-1	R37	C-4	R77	B-1	R117	D-2	R156	G-4	U2	C-4
C38	B-5	L7	D-5	Q33	E-1	R38	C-4	R78	B-1	R118	E-4	R157	C-4	U3	E-3
C39	F-1	L8	C-5	Q34	D-3	R39	C-4	R79	E-3	R119	B-4	R158	D-4	U4	E-3
C40	F-2	L9	C-5	R1	B-3	R40	C-5							XA9	C-3

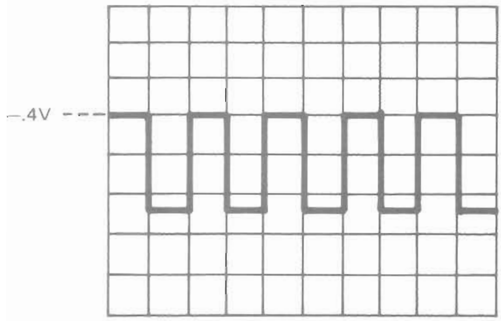
DC VOLTAGE MEASUREMENT CONDITIONS
SCHEMATIC 7

1. Set front-panel controls in accordance with initial control settings in Section V.
2. All voltages are referenced to chassis ground. All indications are nominal and 15% variation from those indicated should be considered normal.

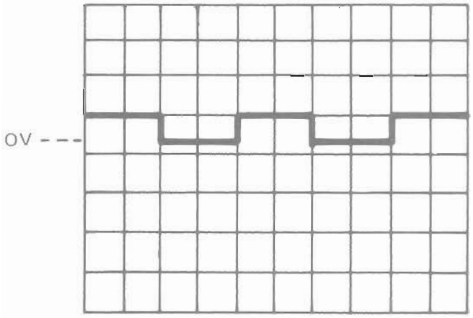
WAVEFORM MEASUREMENT CONDITIONS
SCHEMATIC 7

1. Set front-panel controls in accordance with initial control settings in Section V, except as follows:

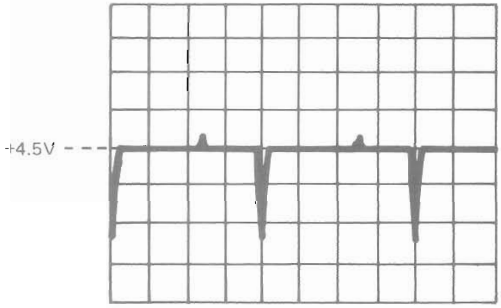
   Coupling (channel A) 50Ω
   TRIGGER LEVEL (main) .... stable display
2. Set monitor oscilloscope TIME/DIV and VOLTS/DIV controls as indicated under waveform(s).
3. Connect HP Model 211B Square-wave Generator 50-ohm output to Model 1740A channel A INPUT connector.
4. Adjust square-wave generator output for 6 divisions of signal amplitude (.6 V) at 5 kHz.



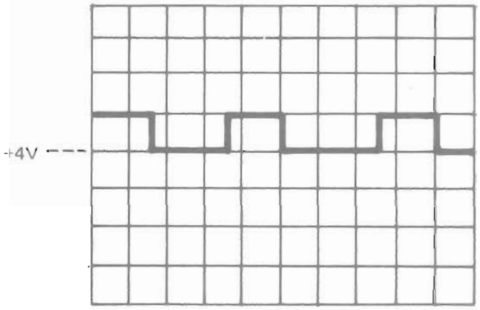
① .2 V/DIV
.1 mSEC/DIV



③ 2 V/DIV
.5 mSEC/DIV



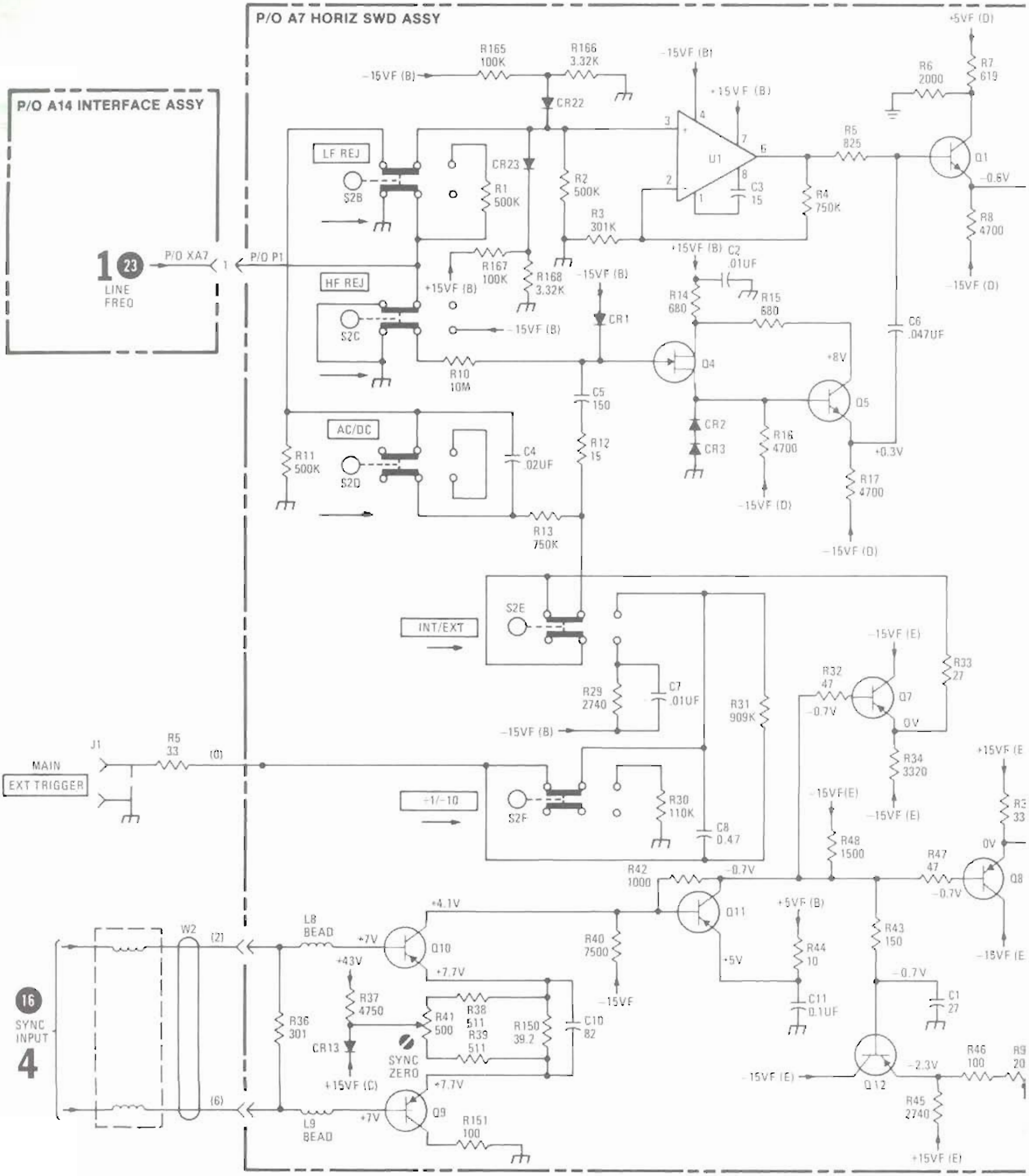
② .5 V/DIV
.5 mSEC/DIV

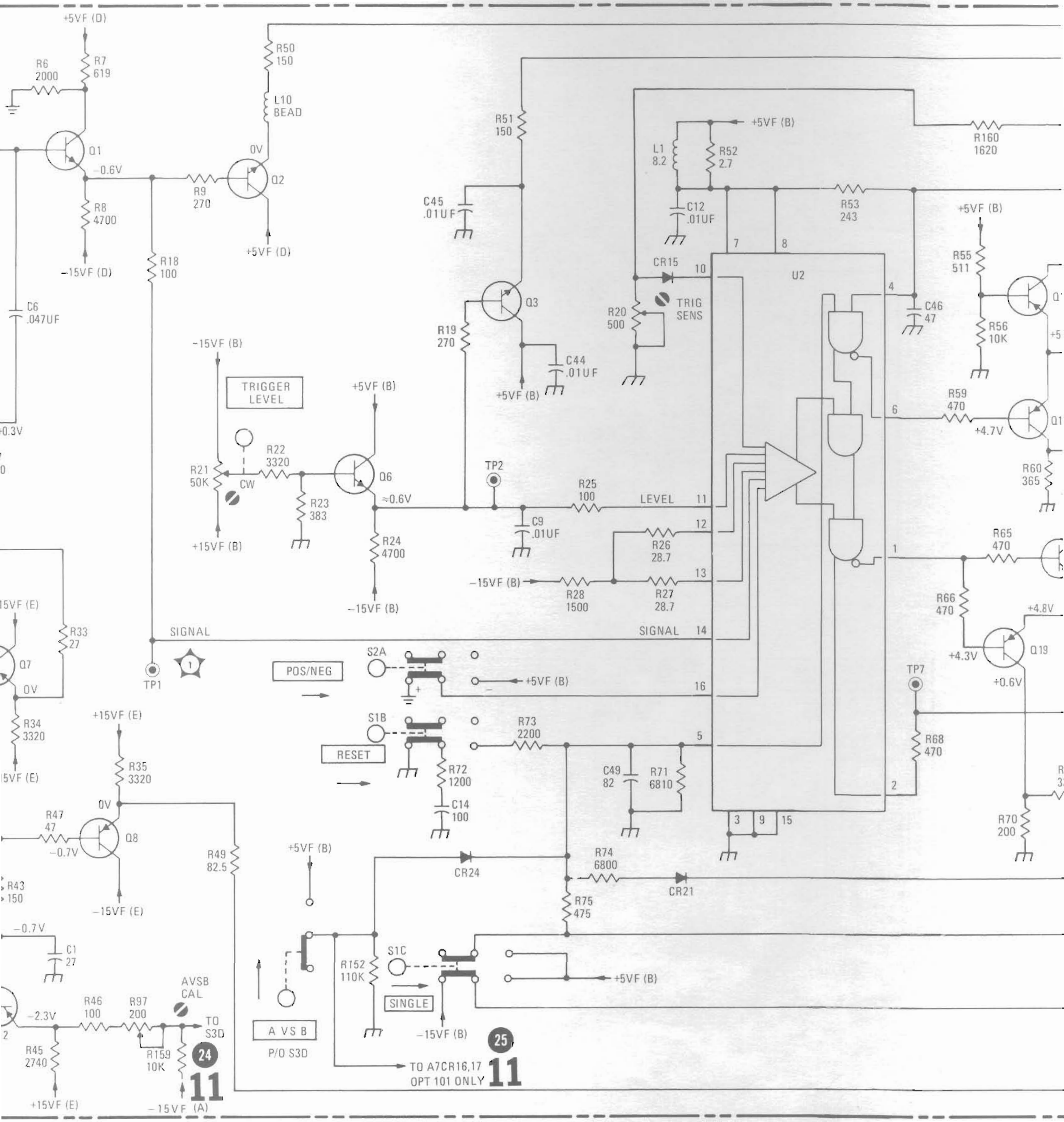


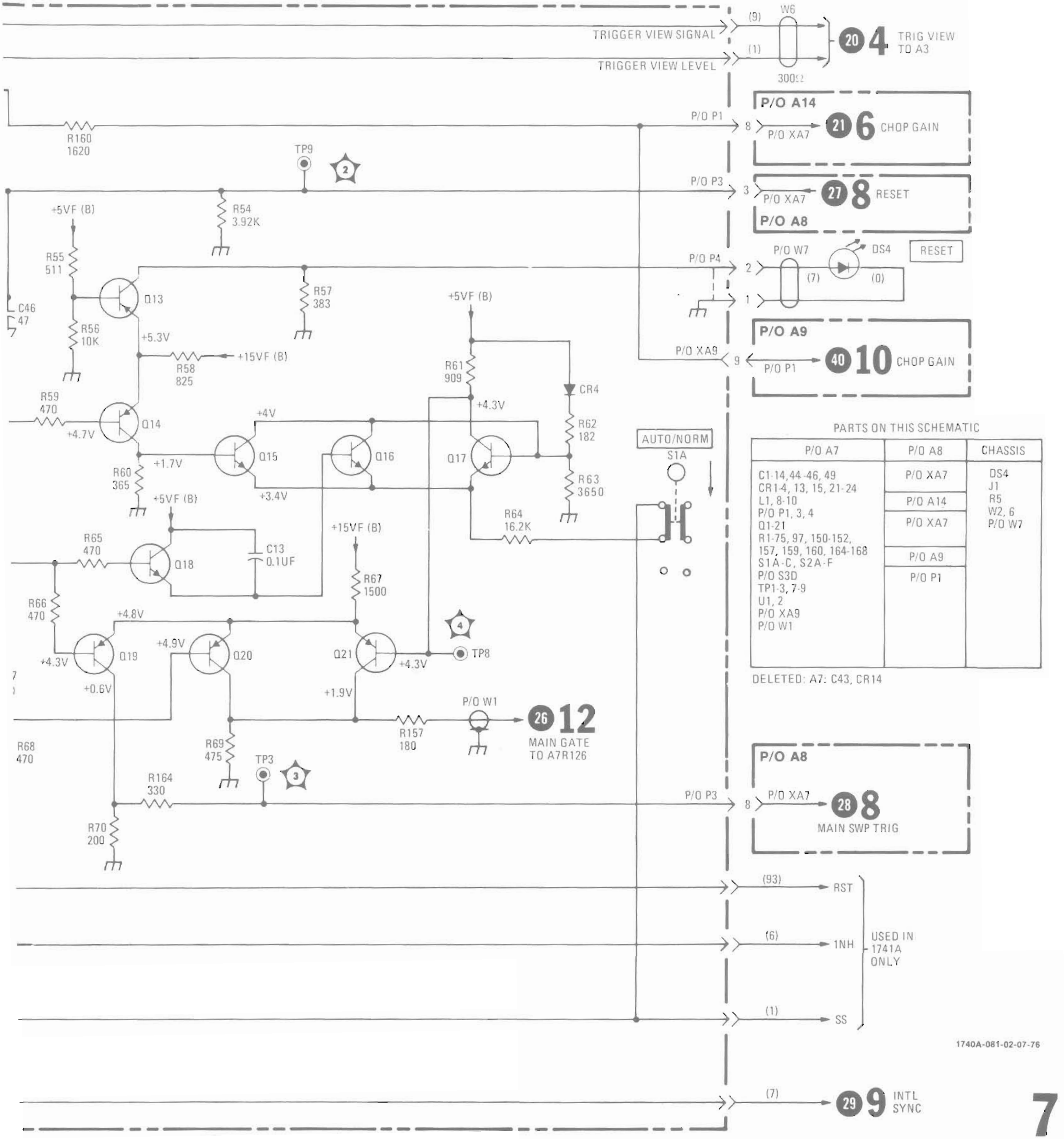
④ 1 V/DIV
.5 mSEC/DIV
REMOVE INPUT SIGNAL

1740A-081-01-10-75

Figure 8-16. Service Information, Main Trigger, P/O Assembly A7 (Sheet 1 of 2)


P/O A7 HORIZ SWD ASSY
P/O A14 INTERFACE ASSY
1
23
LINE FREQ
P/O XA7
P/O P1
-15VF (B)
R165 100K
R166 3.32K
CR22
-15VF (B)
+15VF (B)
U1
3
4
7
6
2
8
1
C3 15
+5VF (D)
R6 2000
R7 619
R5 825
Q1
-0.6V
R8 4700
-15VF (D)
LF REJ
S2B
CR23
R1 500K
R2 500K
R3 301K
R4 750K
HF REJ
S2C
+15VF (B)
R167 100K
R168 3.32K
-15VF (B)
R10 10M
+15VF (B)
C2 .01UF
R14 680
R15 680
CR1
Q4
+8V
Q5
C6 .047UF
AC/DC
S2D
R11 500K
C4 .02UF
C5 150
R12 15
CR2
CR3
R16 4700
-15VF (D)
+0.3V
R17 4700
-15VF (D)
R13 750K
S2E
INT/EXT
R29 2740
C7 .01UF
-15VF (B)
R31 909K
-15VF (E)
R32 47
Q7
-0.7V
0V
R33 27
R34 3320
-15VF (E)
+15VF (E
J1
MAIN
EXT TRIGGER
R5 33
(0)
÷1/÷10
S2F
R30 110K
C8 0.47
-15VF(E)
R48 1500
R3 33
0V
R47 47
Q8
-0.7V
-15VF (E
R42 1000
-0.7V
Q11
+4.1V
R40 7500
-15VF
+5VF (B)
R44 10
+5V
C11 0.1UF
R43 150
-0.7V
C1 27
W2
(2)
L8 BEAD
+7V
Q10
+7.7V
+43V
R37 4750
R41 500
R38 511
R39 511
R150 39.2
C10 82
R36 301
CR13
SYNC ZERO
+15VF (C)
16
SYNC INPUT
4
(6)
L9 BEAD
+7V
Q9
+7.7V
R151 100
Q12
-15VF (E)
-2.3V
R46 100
R9 20
R45 2740
+15VF (E)


+5VF (D)
R6 2000
R7 619
R50 150
L10 BEAD
R51 150
+5VF (B)
L1 8.2
R52 2.7
R160 1620
Q1
-0.6V
0V
Q2
R9 270
R8 4700
-15VF (D)
+5VF (D)
R18 100
C45 .01UF
C12 .01UF
R53 243
+5VF (B)
7
8
CR15
10
U2
R55 511
C6 .047UF
Q3
R20 500
TRIG SENS
4
C46 47
R56 10K
R19 270
C44 .01UF
+5VF (B)
-15VF (B)
TRIGGER LEVEL
+5VF (B)
R59 470
6
+4.7V
+0.3V
R22 3320
R21 50K
CW
Q6
TP2
≈0.6V
R25 100
LEVEL
11
R60 365
R23 383
C9 .01UF
12
R26 28.7
+15VF (B)
R24 4700
1
R65 470
13
-15VF (B)
R28 1500
R27 28.7
R66 470
-15VF (B)
+4.8V
15VF (E)
R33 27
SIGNAL
SIGNAL
14
Q7
+4.3V
Q19
TP1
POS/NEG
S2A
+5VF (B)
16
TP7
+0.6V
0V
R34 3320
+15VF (E)
S1B
R73 2200
5
RESET
R68 470
R35 3320
R72 1200
C49 82
R71 6810
15VF (E)
C14 100
2
0V
3
9
15
R47 47
Q8
R70 200
-0.7V
R49 82.5
+5VF (B)
R74 6800
CR24
CR21
R43 150
-15VF (E)
R75 475
-0.7V
C1 27
R152 110K
S1C
+5VF (B)
AVSB CAL
SINGLE
R46 100
R97 200
-2.3V
TO S3D
A VS B
-15VF (B)
25
R45 2740
R159 10K
24
P/O S3D
TO A7CR16,17 OPT 101 ONLY
11
11
+15VF (E)
-15VF (A)

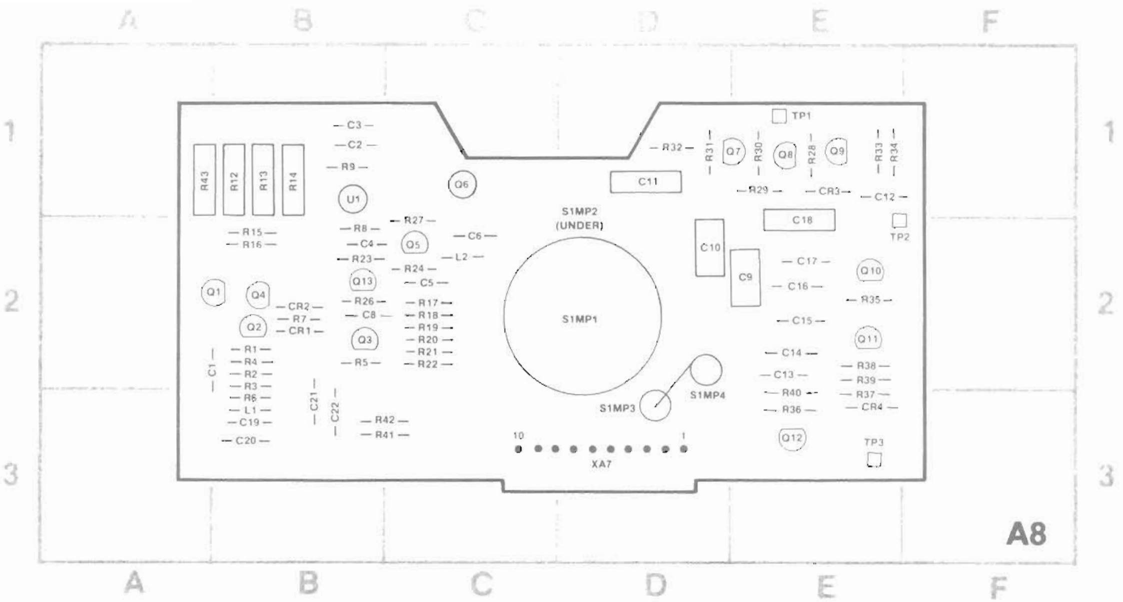

TRIGGER VIEW SIGNAL
TRIGGER VIEW LEVEL
(9)
(1)
W6
300Ω
20 4 TRIG VIEW TO A3
R160 1620
P/O P1
8
P/O A14
P/O XA7
21 6 CHOP GAIN
TP9
2
P/O P3
3
P/O XA7
27 8 RESET
P/O A8
+5VF (B)
R54 3.92K
R55 511
Q13
R57 383
P/O P4
2
1
P/O W7
(7)
(0)
DS4
RESET
C46 47
R56 10K
+5.3V
+5VF (B)
P/O A9
P/O XA9
9
P/O P1
40 10 CHOP GAIN
R58 825
+15VF (B)
R61 909
CR4
+4.3V
R59 470
+4.7V
Q14
+4V
R62 182
Q15
Q16
Q17
R60 365
+1.7V
+3.4V
R63 3650
AUTO/NORM
S1A
+5VF (B)
R64 16.2K
R65 470
Q18
C13 0.1UF
+15VF (B)
R67 1500
R66 470
+4.8V
4
+4.9V
Q19
Q20
Q21
TP8
+4.3V
+4.3V
+0.6V
+1.9V
P/O W1
26 12 MAIN GATE TO A7R126
R157 180
R68 470
R69 475
TP3
3
R164 330
P/O P3
8
P/O A8
P/O XA7
28 8 MAIN SWP TRIG
R70 200
(93)
RST
(6)
1NH
(1)
SS
USED IN 1741A ONLY
1740A-081-02-07-76
(7)
29 9 INTL SYNC
7

PARTS ON THIS SCHEMATIC

P/O A7	P/O A8	CHASSIS
C1-14, 44-46, 49 CR1-4, 13, 15, 21-24 L1, 8-10 P/O P1, 3, 4 Q1-21 R1-75, 97, 150-152, 157, 159, 160, 164-168 S1A-C, S2A-F P/O S3D TP1-3, 7-9 U1, 2 P/O XA9 P/O W1	P/O XA7 P/O A14 P/O XA7 P/O A9 P/O P1	DS4 J1 R5 W2, 6 P/O W7

DELETED: A7: C43, CR14

Figure 8-16.
Service Information, Main Trigger, P/O Assembly A7 (Sheet 2 of 2)


A
B
C
D
E
F
1
2
3
A8
TP1
R32
R31
Q7
R30
Q8
R28
Q9
R33
R34
C11
R29
CR3
C12
C18
TP2
C10
C9
C17
C16
Q10
R35
C15
Q11
C14
C13
R38
R39
R40
R37
R36
CR4
Q12
TP3
S1MP2
(UNDER)
S1MP1
S1MP3
S1MP4
10
1
XA7
C3
C2
R9
Q6
R43
R12
R13
R14
U1
R15
R16
R8
R27
C4
Q5
C6
R23
L2
R24
Q13
C5
R26
R17
C8
R18
R19
R20
R21
R22
Q3
R5
Q1
Q4
CR2
R7
Q2
CR1
R1
R4
R2
R3
R6
L1
C19
C20
C1
C21
C22
R42
R41

1740A-082-07-76

REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC
C1	A-2	C17	E-2	Q4	B-2	R5	B-2	R22	C-2	R38	E-2
C2	B-1	C18	E-2	Q5	C-2	R6	B-3	R23	B-2	R39	E-2
C3	B-1	C19	B-3	Q6	C-1	R7	B-2	R24	C-2	R40	E-2
C4	B-2	C20	B-3	Q7	E-1	R8	B-2	R26	B-2	R41	B-3
C5	C-2	C21	B-3	Q8	E-1	R9	B-1	R27	C-2	R42	B-3
C6	C-2	C22	B-3	Q9	E-1	R12	B-1	R28	E-1	R43	A-1
C8	B-2	CR1	B-2	Q9	E-1	R13	B-1	R29	E-1	S1MP1	D-2
C9	E-2	CR2	B-2	Q10	E-2	R14	B-1	R30	E-1	S1MP2	D-1
C10	D-2	CR3	E-1	Q11	E-2	R15	B-2	R31	D-1	S1MP3	D-3
C11	D-1	CR4	E-3	Q12	E-3	R16	B-2	R32	D-1	S1MP4	D-3
C12	E-1	L1	B-3	Q13	B-2	R17	C-2	R33	E-1	TP1	E-1
C13	E-2	L2	C-2	R1	B-2	R18	C-2	R34	E-1	TP2	E-2
C14	E-2	Q1	B-2	R2	B-2	R19	C-2	R35	E-2	TP3	E-3
C15	E-2	Q2	B-2	R3	B-2	R20	C-2	R36	E-3	U1	B-1
C16	E-2	Q3	B-2	R4	B-2	R21	C-2	R37	E-3	XA7	D-3

DC VOLTAGE MEASUREMENT CONDITIONS
SCHEMATIC 8

1. Set front-panel controls in accordance with initial control settings in Section V, except as follows:

Main TRIGGER LEVEL	fully cw
AUTO/NORM	NORM
SINGLE	engaged
RESET light should be off	

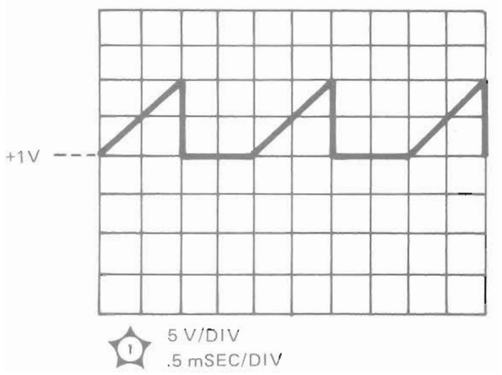
2. All voltages are referenced to chassis ground. All indications are nominal and 15% variation from those indicated should be considered normal.

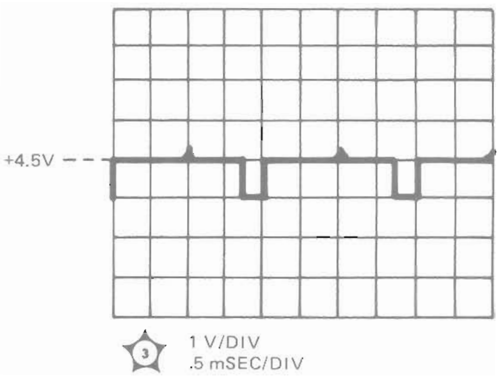
WAVEFORM MEASUREMENT CONDITIONS
SCHEMATIC 8

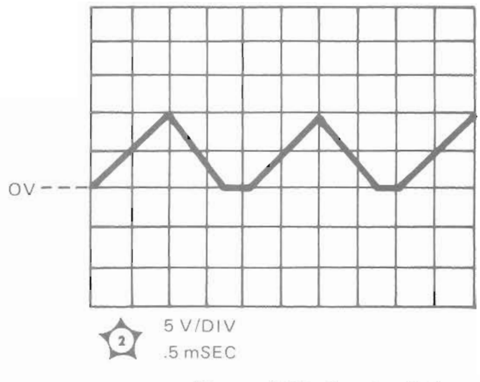
1. Set front-panel controls in accordance with initial control settings in Section V, except as follows:

Coupling (channel A)	50Ω
TRIGGER LEVEL (main)	stable display

2. Set monitor oscilloscope TIME/DIV and VOLTS/DIV controls as indicated under waveform(s).
3. Connect HP Model 211B Square-wave Generator 50-ohm output to Model 1740A channel A INPUT connector.
4. Adjust square-wave generator output for 6 divisions of signal amplitude (.6 V) at 5 kHz.



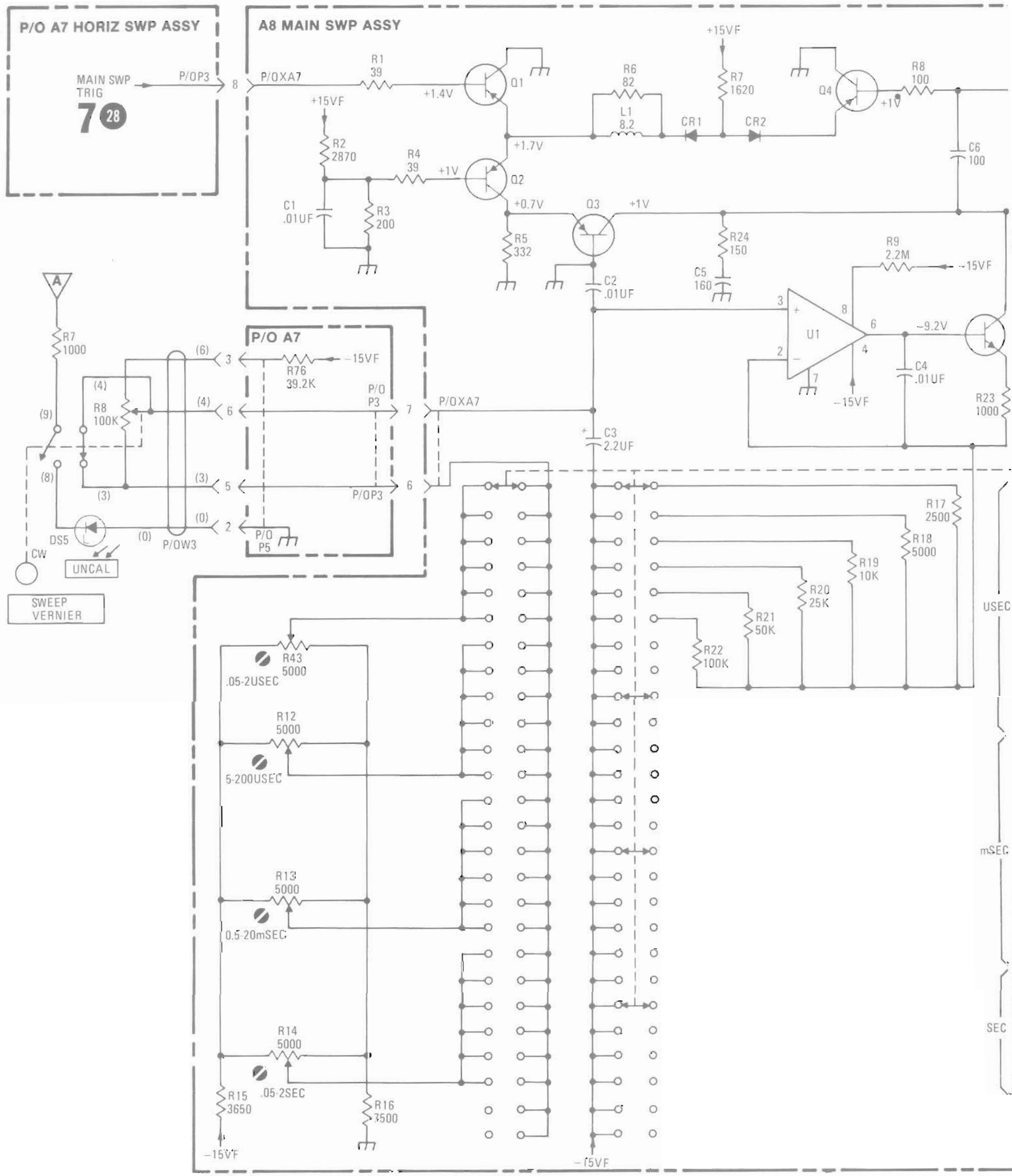


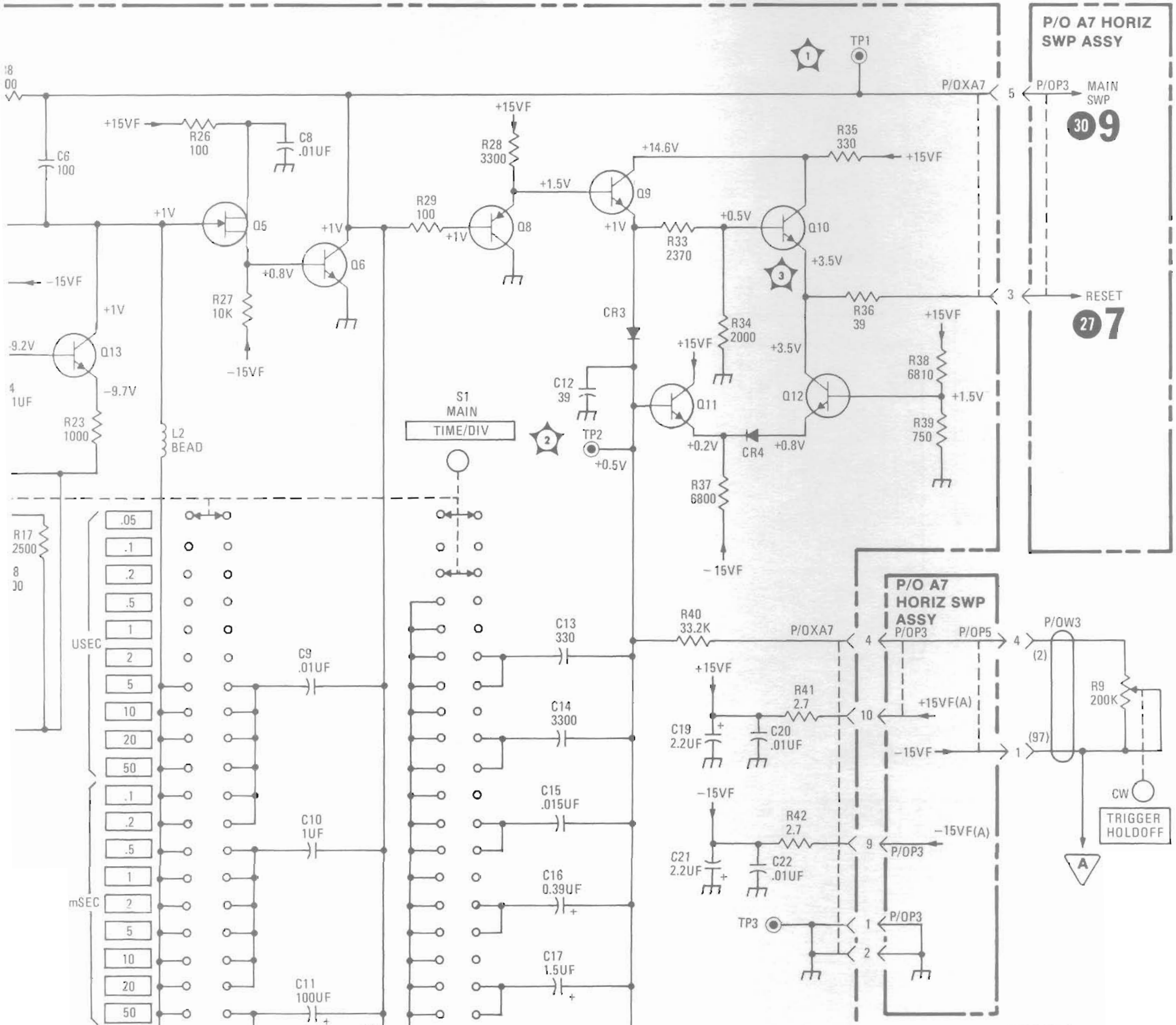


NOTE: WAVEFORMS ARE TIME RELATED

1740A-083-01-10-75

Figure 8-17. Service Information, Main Sweep Assembly A8 (Sheet 1 of 2)


P/O A7 HORIZ SWP ASSY
MAIN SWP TRIG
P/OP3
7 ㉘
A8 MAIN SWP ASSY
P/OXA7
R1 39
+1.4V
Q1
+15VF
R2 2870
R4 39
+1V
Q2
C1 .01UF
R3 200
R5 332
+1.7V
+0.7V
Q3
+1V
R6 82
L1 8.2
CR1
CR2
R7 1620
Q4
+1V
R8 100
C6 100
R24 150
C5 160
C2 .01UF
R9 2.2M
-15VF
U1
-9.2V
C4 .01UF
R23 1000
-15VF
A
R7 1000
R8 100K
(9)
(8)
(4)
(6)
(3)
(0)
DS5
CW
UNCAL
SWEEP VERNIER
P/OW3
P/O A7
R76 39.2K
-15VF
P/O P3
P/OP3
P/O P5
P/OXA7
C3 2.2UF
R17 2500
R18 5000
R19 10K
R20 25K
R21 50K
R22 100K
USEC
mSEC
SEC
R43 5000
.05-2USEC
R12 5000
5-200USEC
R13 5000
0.5-20mSEC
R14 5000
.05-2SEC
R15 3650
R16 3500
-15VF
-15VF


P/O A7 HORIZ SWP ASSY
TP1
P/OXA7
5
P/OP3
MAIN SWP
30 9
+15VF
R26 100
C8 .01UF
C6 100
R28 3300
+14.6V
R35 330
+1.5V
Q9
R29 100
Q8
Q5
Q6
+1V
+0.8V
+0.5V
Q10
R33 2370
+3.5V
R36 39
3
RESET
27 7
-15VF
R27 10K
Q13
-9.2V
-9.7V
R23 1000
L2 BEAD
CR3
R34 2000
R38 6810
C12 39
Q11
Q12
+1.5V
S1 MAIN TIME/DIV
TP2
+0.2V
CR4
R39 750
R37 6800
R17 2500
USEC
mSEC
SEC
.05
.1
.2
.5
1
2
5
10
20
50
C9 .01UF
C10 1UF
C11 100UF
C13 330
C14 3300
C15 .015UF
C16 0.39UF
C17 1.5UF
C18 33UF
Q7
+12.7V
+13.3V
R30 150
R31 511
R32 3000
P/O A7 HORIZ SWP ASSY
R40 33.2K
4
P/OP5
P/OW3
(2)
R9 200K
+15VF(A)
10
R41 2.7
C19 2.2UF
C20 .01UF
(97)
1
CW
TRIGGER HOLDOFF
A
R42 2.7
9
-15VF(A)
C21 2.2UF
C22 .01UF
TP3
2
1740A-083-02-07-76

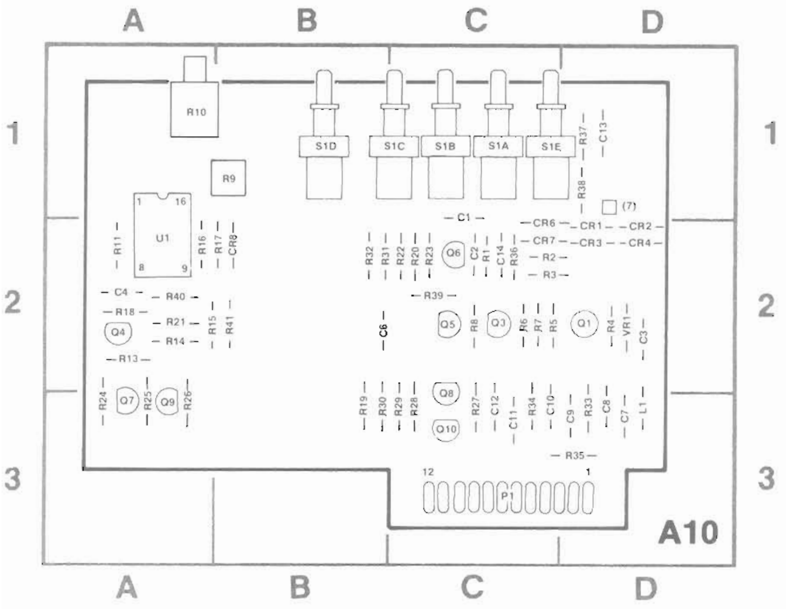
PARTS ON THIS SCHEMATIC

A8	P/OA7
C1-6, 8-22 CR1-4 L1, 2 Q1-13 R1-9, 12-24 26-43 S1 TP1-3 U1 XA7	P3, P/OP5 R76
	CHASSIS
	DS5 R7-9 P/OW3

DELETED: A8, C7, C23, R10, R11, R25

8

Figure 8-17.
Service Information, Main Sweep Assembly A8 (Sheet 2 of 2)


A
B
C
D
1
2
3
R10
S1D
S1C
S1B
S1A
S1E
R37
C13
R9
R38
(7)
1
16
U1
R11
8
9
R16
R17
CR8
C1
CR6
CR1
CR2
CR7
CR3
CR4
R32
R31
R22
R20
R23
Q6
C2
R1
C14
R36
R2
R3
C4
R40
R18
R39
Q4
R21
R15
R41
R14
C6
Q5
R8
Q3
R6
R7
R5
Q1
R4
VR1
C3
R13
R24
Q7
R25
Q9
R26
R19
R30
R29
R28
Q8
R27
C12
C11
R34
C10
C9
R33
C8
C7
L1
Q10
R35
12
1
P1
A10

1740A-084-07-76

REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC
C1	C-1	C14	C-2	Q3	C-2	R4	D-2	R16	A-2	R27	C-3	R38	D-1
C2	C-2	CR1	D-2	Q4	A-2	R5	D-2	R17	B-2	R28	C-3	R39	C-2
C3	D-2	CR2	D-2	Q5	C-2	R6	C-2	R18	A-2	R29	C-3	R40	A-2
C4	A-2	CR3	D-2	Q6	C-2	R7	C-2	R19	B-3	R30	C-3	R41	B-2
C6	B-2	CR4	D-2	Q7	A-3	R8	C-2	R20	C-2	R31	C-2	S1A	C-1
C7	D-3	CR6	C-2	Q8	C-2	R9	B-1	R21	A-2	R32	B-2	S1B	C-1
C8	D-3	CR7	C-2	Q9	A-3	R10	A-1	R22	C-2	R33	D-3	S1C	C-1
C9	D-3	CR8	B-2	Q10	C-3	R11	A-2	R23	C-2	R34	C-3	S1D	B-1
C10	D-3	L1	D-3	R1	C-2	R13	A-2	R24	A-3	R35	D-3	S1E	C-1
C11	C-3	P1	C-3	R2	C-2	R14	A-2	R25	A-3	R36	C-2	U1	A-2
C12	C-3	Q1	D-2	R3	C-2	R15	B-2	R26	A-3	R37	D-1	VR1	D-2
C13	D-1												

DC VOLTAGE MEASUREMENT CONDITIONS
SCHEMATIC 9

1. Set front-panel controls in accordance with initial control settings in Section V, except as follows:

DLY'D TIME/DIV	50 μSEC

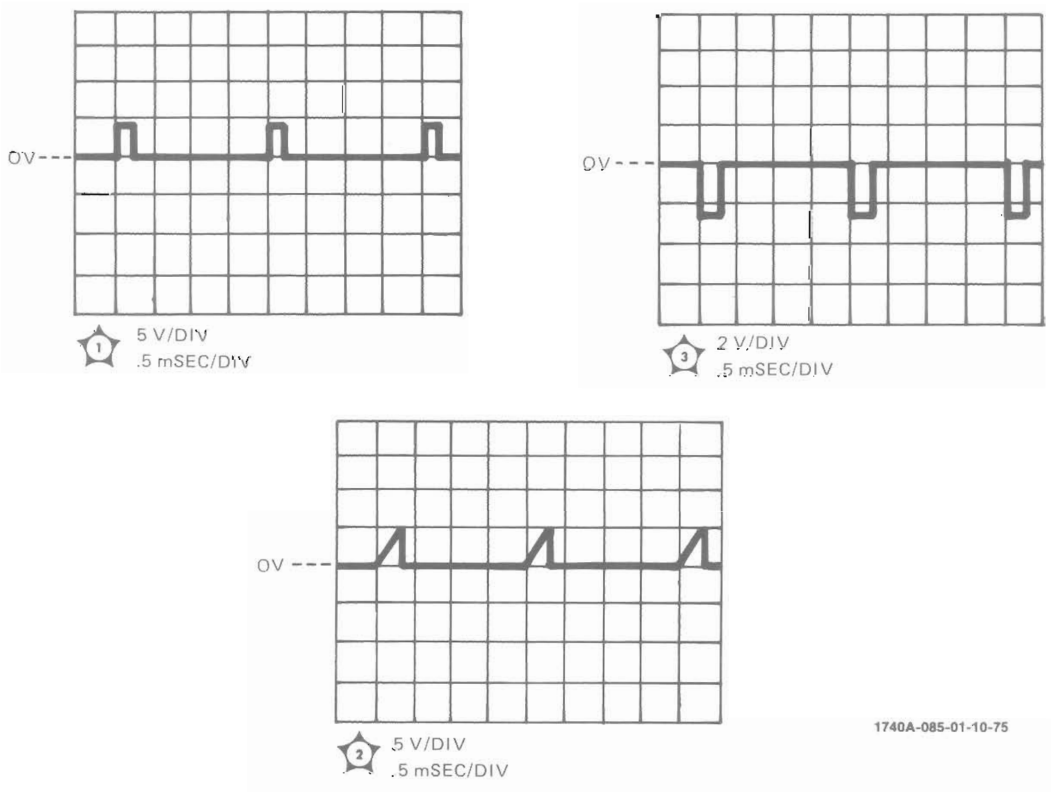
2. All voltages are referenced to chassis ground. All indications are nominal and 15% variation from those indicated should be considered normal.

WAVEFORM MEASUREMENT CONDITIONS
SCHEMATIC 9

1. Set front-panel controls in accordance with initial control settings in Section V, except as follows:

Coupling (channel A)	50Ω
DLY'D TIME/DIV	10 μSEC
DELAY	5.00
Horiz display	MAIN
TRIGGER LEVEL (main)	stable display

2. Set monitor oscilloscope TIME/DIV and VOLTS/DIV controls as indicated under waveform(s).
3. Connect HP Model 211B Square-wave Generator 50-ohm output to Model 1740A channel A INPUT connector.
4. Adjust square-wave generator output for 6 divisions of signal amplitude (.6 V) at 5 kHz.



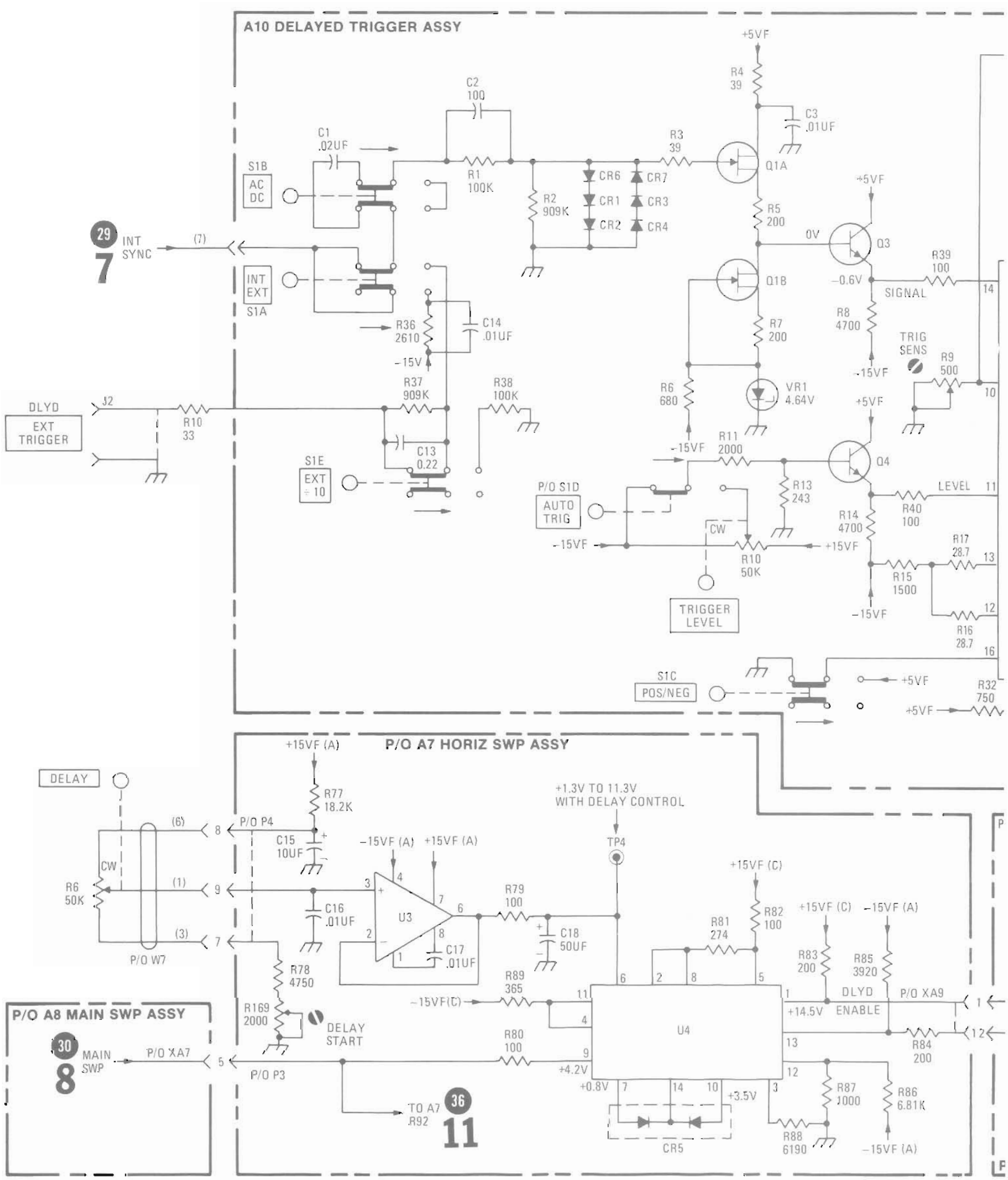
5 V/DIV
.5 mSEC/DIV

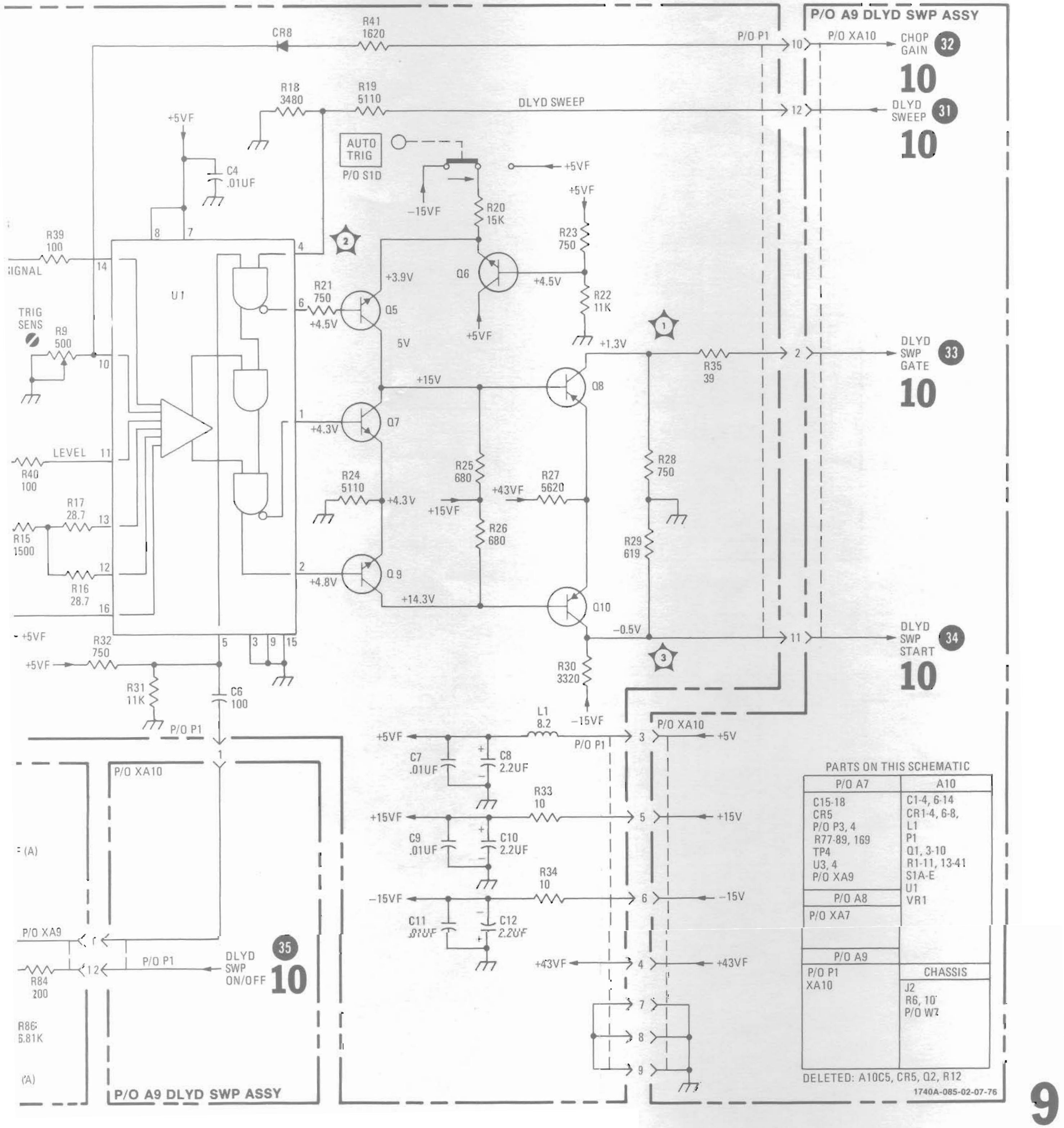
2 V/DIV
.5 mSEC/DIV

.5 V/DIV
.5 mSEC/DIV

1740A-085-01-10-75

Figure 8-18. Service Information, Delayed Trigger Assembly A10 and Horizontal Sweep Assembly A7 (Sheet 1 of 2)


A10 DELAYED TRIGGER ASSY
+5VF
R4
39
C2
100
C3
.01UF
C1
.02UF
R3
39
Q1A
S1B
AC
DC
R1
100K
CR6
CR7
CR1
CR3
CR2
CR4
R2
909K
R5
200
+5VF
0V
Q3
29
7
INT
SYNC
(7)
INT
EXT
S1A
Q1B
−0.6V
R39
100
SIGNAL
14
R36
2610
C14
.01UF
R7
200
R8
4700
TRIG
SENS
−15V
−15VF
R9
500
R37
909K
R38
100K
R6
680
VR1
4.64V
+5VF
10
DLYD
EXT
TRIGGER
J2
R10
33
−15VF
R11
2000
Q4
C13
0.22
S1E
EXT
÷10
P/O S1D
AUTO
TRIG
R13
243
LEVEL
11
R14
4700
R40
100
CW
−15VF
R10
50K
+15VF
R17
28.7
13
R15
1500
TRIGGER
LEVEL
−15VF
12
R16
28.7
16
S1C
POS/NEG
+5VF
R32
750
+5VF
P/O A7 HORIZ SWP ASSY
+15VF (A)
R77
18.2K
DELAY
+1.3V TO 11.3V
WITH DELAY CONTROL
(6)
8
P/O P4
C15
10UF
−15VF (A)
+15VF (A)
TP4
+15VF (C)
CW
R6
50K
(1)
9
3
4
7
U3
6
R79
100
C16
.01UF
2
8
1
C17
.01UF
C18
50UF
R82
100
+15VF (C)
−15VF (A)
R81
274
(3)
7
P/O W7
R78
4750
R89
365
6
2
8
5
R83
200
R85
3920
P/O A8 MAIN SWP ASSY
R169
2000
DELAY
START
−15VF(C)
11
4
1
DLYD
P/O XA9
+14.5V
ENABLE
1
U4
30
8
MAIN
SWP
P/O XA7
5
R80
100
9
13
R84
200
12
P/O P3
+4.2V
12
+0.8V
7
14
10
+3.5V
3
R87
1000
R86
6.81K
TO A7
R92
36
11
CR5
R88
6190
−15VF (A)


P/O A9 DLYD SWP ASSY
P/O P1
P/O XA10
CHOP GAIN 32 10
DLYD SWEEP 31 10
DLYD SWP GATE 33 10
DLYD SWP START 34 10
DLYD SWP ON/OFF 35 10
CR8
R41 1620
R18 3480
R19 5110
DLYD SWEEP
AUTO TRIG
P/O S1D
+5VF
−15VF
C4 .01UF
R39 100
IGNAL
TRIG SENS
R9 500
LEVEL
R40 100
R17 28.7
R15 1500
R16 28.7
U1
R21 750
Q5
Q6
Q7
Q8
Q9
Q10
R20 15K
R23 750
R22 11K
+3.9V
+4.5V
5V
+15V
+4.3V
+4.8V
+14.3V
+1.3V
−0.5V
R24 5110
R25 680
R26 680
+43VF
R27 5620
+15VF
R28 750
R29 619
R35 39
R30 3320
R32 750
R31 11K
C6 100
L1 8.2
+5VF
C7 .01UF
C8 2.2UF
R33 10
C9 .01UF
C10 2.2UF
R34 10
C11 .01UF
C12 2.2UF
+5V
+15V
−15V
+43VF
P/O XA9
R84 200
R86 5.81K
(A)
9

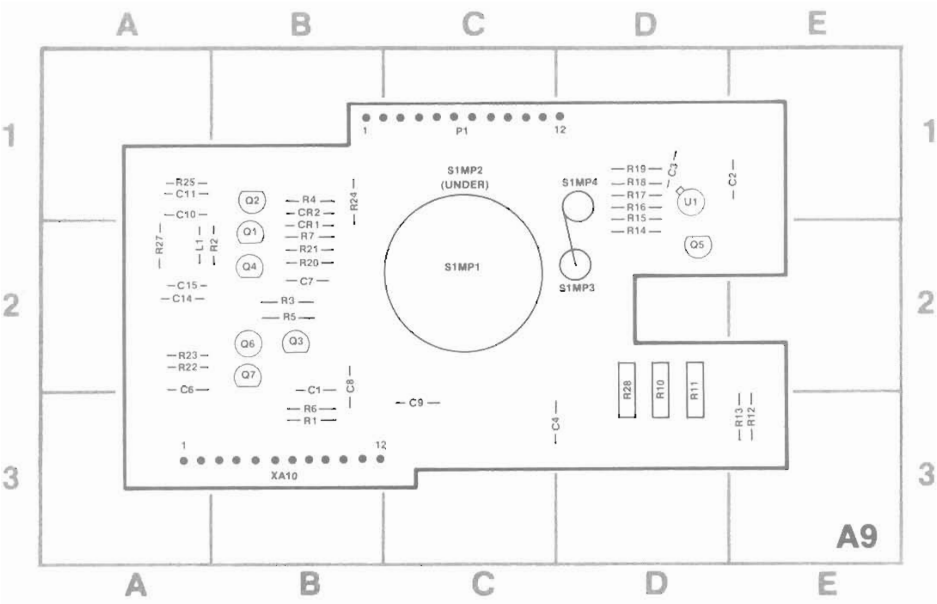
PARTS ON THIS SCHEMATIC

P/O A7	A10
C15-18 CR5 P/O P3, 4 R77-89, 169 TP4 U3, 4 P/O XA9	C1-4, 6-14 CR1-4, 6-8, L1 P1 Q1, 3-10 R1-11, 13-41 S1A-E U1 VR1
P/O A8	
P/O XA7	
P/O A9	CHASSIS
P/O P1 XA10	J2 R6, 10 P/O W7

DELETED: A10C5, CR5, Q2, R12

1740A-085-02-07-76

Figure 8-18. Service Information, Delayed Trigger Assembly A10 and Horizontal Sweep Assembly A7 (Sheet 2 of 2)


A
B
C
D
E
1
2
3
1
P1
12
S1MP2
(UNDER)
S1MP4
R19
R18
R17
R16
R15
R14
C3
U1
C2
Q5
R25
C11
Q2
R4
CR2
CR1
R7
R21
R20
R24
C10
Q1
R27
L1
R2
Q4
S1MP1
S1MP3
C15
C14
C7
R3
R5
Q6
Q3
R23
R22
Q7
C6
C1
C8
C9
R6
R1
C4
R28
R10
R11
R13
R12
1
12
XA10
A9

1740A-086-10-75

REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC
C1	B-2	C15	A-2	Q7	B-2	R13	E-3	R24	B-1
C2	E-1	CR1	B-2	R1	B-3	R14	D-2	R25	A-1
C3	D-1	CR2	B-1	R2	B-2	R15	D-1	R27	A-2
C4	C-3	L1	A-2	R3	B-2	R16	D-1	R28	D-2
C6	A-2	P1	C-1	R4	B-1	R17	D-1	S1MP1	C-2
C7	B-2	Q1	B-2	R5	B-2	R18	D-1	S1MP2	C-1
C8	B-2	Q2	B-1	R6	B-3	R19	D-1	S1MP3	D-2
C9	C-3	Q3	B-2	R7	B-2	R20	B-2	S1MP4	D-1
C10	A-1	Q4	B-2	R10	D-2	R21	B-2	U1	D-1
C11	A-1	Q5	D-2	R11	D-2	R22	A-2	XA10	B-3
C14	A-2	Q6	B-2	R12	E-3	R23	A-1		

DC VOLTAGE MEASUREMENT CONDITIONS
SCHEMATIC 10

1. Set front-panel controls in accordance with initial control settings in Section V, except as follows:

DLY'D TIME/DIV	50 μSEC
AUTO/NORM	NORM
SINGLE	engaged
Both TRIGGER LEVELS	fully cw

   RESET light should be off

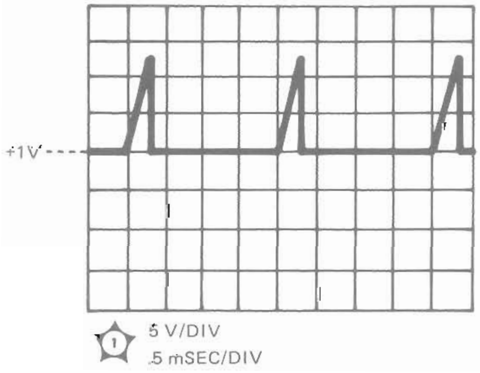
2. All voltages are referenced to chassis ground. All indications are nominal and 15% variation from those indicated should be considered normal.

WAVEFORM MEASUREMENT CONDITIONS
SCHEMATIC 10

1. Set front-panel controls in accordance with initial control settings in Section V, except as follows:

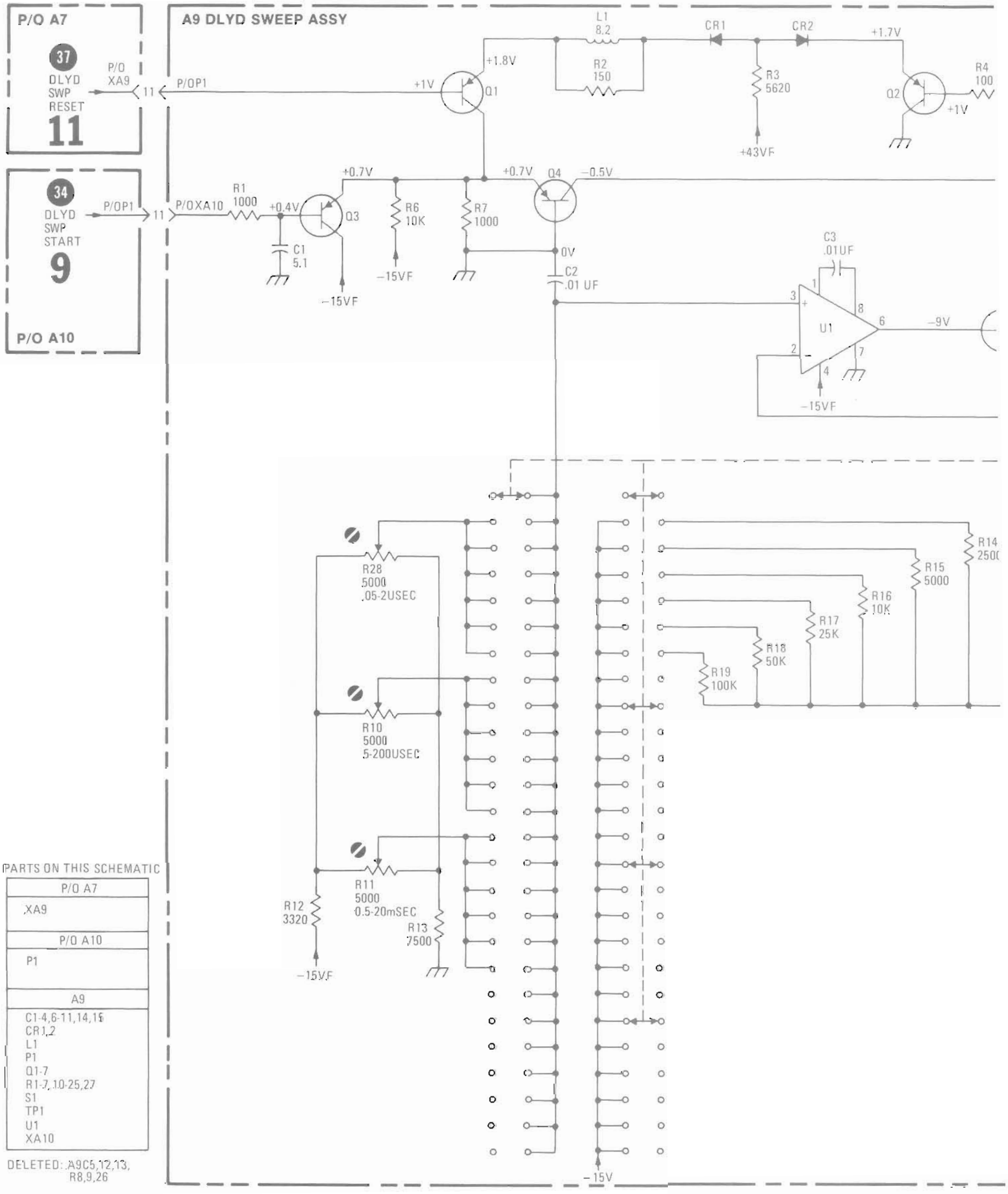
Coupling (channel A)	50Ω
DLY'D TIME/DIV	10 μSEC
DELAY	5.00
Horiz display	MAIN
TRIGGER LEVEL (main)	stable display

2. Set monitor oscilloscope TIME/DIV and VOLTS/DIV controls as indicated under waveform(s).
3. Connect HP Model 211B Square-wave Generator 50-ohm output to Model 1740A channel A INPUT connector.
4. Adjust square-wave generator output for 6 divisions of signal amplitude (.6 V) at 5 kHz.



1740A-087-01-10-75

Figure 8-19. Service Information, Delayed Sweep Assembly A9 (Sheet 1 of 2)


P/O A7
37
DLYD
SWP
RESET
11
P/O
XA9
11
P/O A10
34
DLYD
SWP
START
9
P/OP1
11
A9 DLYD SWEEP ASSY
P/OP1
P/OXA10
+1V
Q1
+1.8V
L1
8.2
R2
150
CR1
CR2
R3
5620
+43VF
+1.7V
Q2
+1V
R4
100
R1
1000
+0.4V
C1
5.1
Q3
−15VF
+0.7V
R6
10K
−15VF
R7
1000
+0.7V
Q4
−0.5V
0V
C2
.01 UF
C3
.01UF
U1
−9V
−15VF
R28
5000
.05-2USEC
R10
5000
5-200USEC
R11
5000
0.5-20mSEC
R12
3320
−15VF
R13
7500
R14
250
R15
5000
R16
10K
R17
25K
R18
50K
R19
100K
−15V

PARTS ON THIS SCHEMATIC

P/O A7	XA9
P/O A10	P1
A9	C1-4,6-11,14,15 CR1,2 L1 P1 Q1-7 R1-7,10-25,27 S1 TP1 U1 XA10

DELETED: A9C5,12,13,
R8,9,26

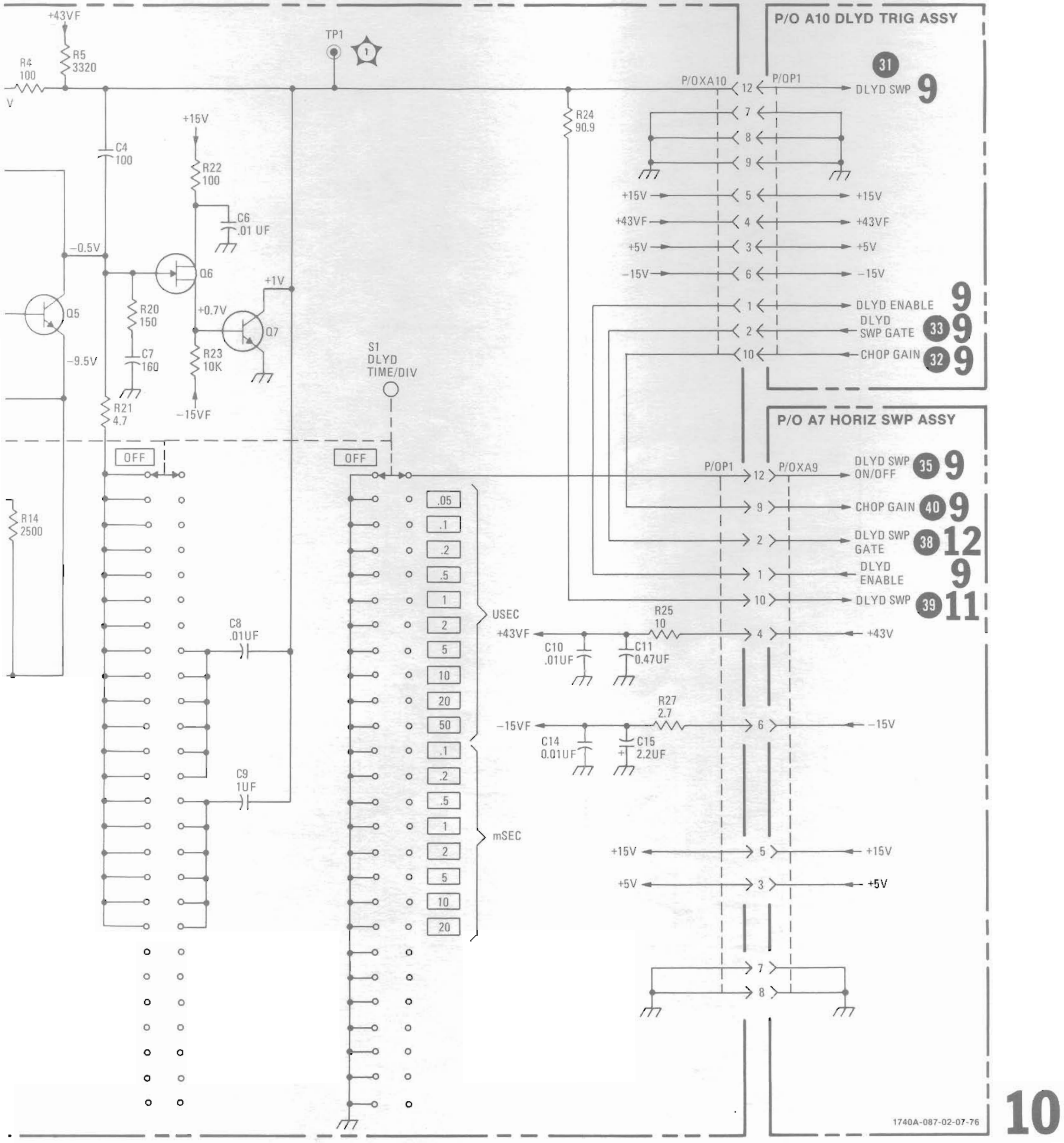
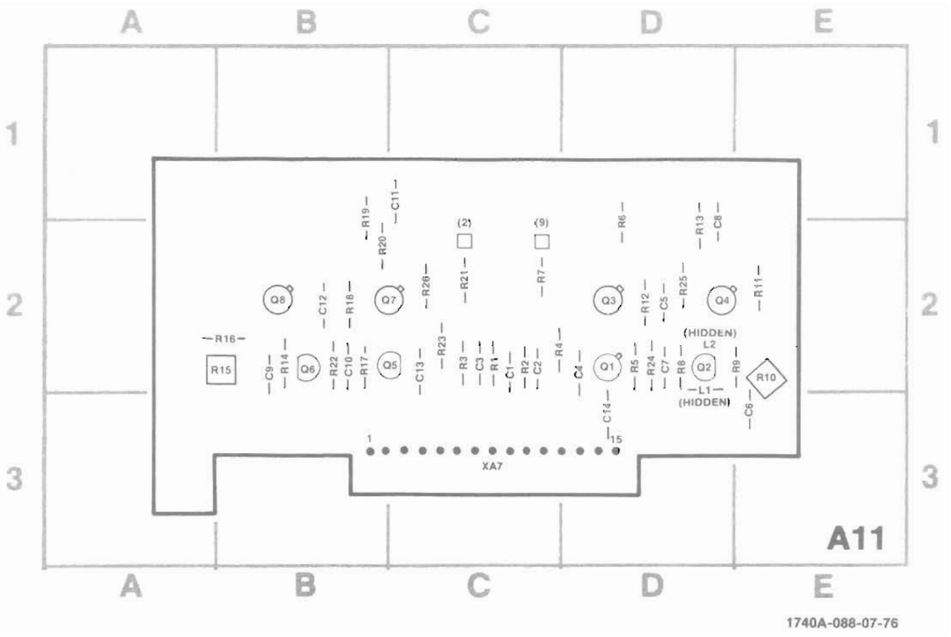

P/O A10 DLYD TRIG ASSY
P/O A7 HORIZ SWP ASSY
+43VF
R5
3320
R4
100
TP1
1
C4
100
+15V
R22
100
C6
.01 UF
-0.5V
Q6
Q5
+1V
R20
150
+0.7V
Q7
C7
160
R23
10K
-9.5V
R21
4.7
-15VF
S1
DLYD
TIME/DIV
OFF
OFF
R14
2500
R24
90.9
P/OXA10
P/OP1
P/OP1
P/OXA9
DLYD SWP
DLYD ENABLE
DLYD SWP GATE
CHOP GAIN
DLYD SWP ON/OFF
+15V
+43VF
+5V
-15V
31
32
33
35
38
39
40
9
12
11
.05
.1
.2
.5
1
2
5
10
20
50
USEC
mSEC
C8
.01UF
C9
1UF
R25
10
C10
.01UF
C11
0.47UF
R27
2.7
C14
0.01UF
C15
2.2UF
+43V
1740A-087-02-07-76
10

Figure 8-19.
Service Information, Delayed Sweep Assembly A9 (Sheet 2 of 2)

NOTE
See Figure 8-16
for Assembly A7
Component Identification


A
B
C
D
E
1
2
3
R19
C11
R20
(2)
(9)
R6
R13
C8
Q8
C12
R18
Q7
R26
R21
R7
Q3
R12
C5
R25
Q4
R11
R16
(HIDDEN)
L2
R15
C9
R14
Q6
R22
C10
R17
Q5
C13
R23
R3
C3
R1
C1
R2
C2
R4
C4
Q1
R5
R24
C7
R8
Q2
R9
R10
L1
(HIDDEN)
C6
C14
1
15
XA7
A11
1740A-088-07-76

REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC
C1	C-2	C12	B-2	Q6	B-2	R8	D-2	R18	B-2
C2	C-2	C13	C-2	Q7	C-2	R9	E-2	R19	B-2
C3	C-2	C14	D-3	Q8	B-2	R10	E-2	R20	B-2
C4	D-2	L1	D-3	R1	C-2	R11	E-2	R21	C-2
C5	D-2	L2	D-2	R2	C-2	R12	D-2	R22	B-2
C6	D-2	Q1	D-2	R3	C-2	R13	D-2	R23	C-2
C7	D-2	Q2	D-2	R4	C-2	R14	B-2	R24	D-2
C8	D-2	Q3	D-2	R5	D-2	R15	B-2	R25	D-2
C9	B-2	Q4	D-2	R6	D-2	R16	B-2	R26	C-2
C10	B-2	Q5	C-2	R7	C-2	R17	B-2	XA7	C-3
C11	C-1								

DC VOLTAGE MEASUREMENT CONDITIONS
SCHEMATIC 11

1. Set front-panel controls in accordance with initial control settings in Section V, except as follows:

   Sweep mode .... A vs B
   Spot centered on CRT.

   BEAM INTENSITY .... barely visible spot

2. All voltages are referenced to chassis ground. All indications are nominal and 15% variation from those indicated should be considered normal.

WAVEFORM MEASUREMENT CONDITIONS
SCHEMATIC 11

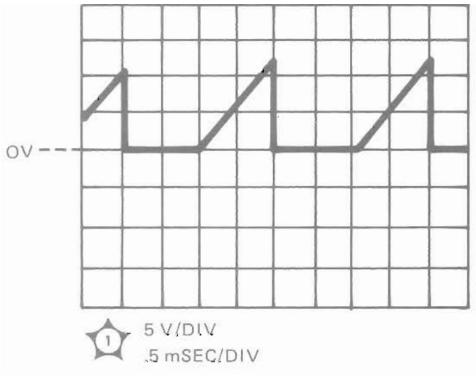
1. Set front-panel controls in accordance with initial control settings Section V, except as follows:

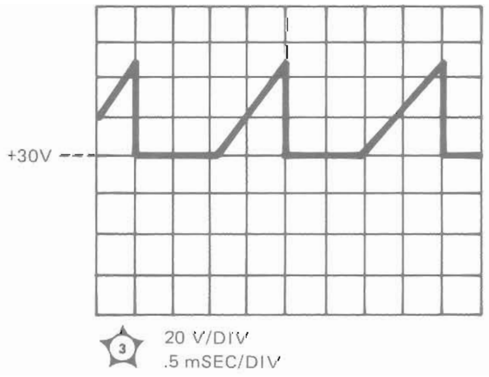
   Coupling (channel A) 50Ω
   TRIGGER LEVEL (main) .... stable display

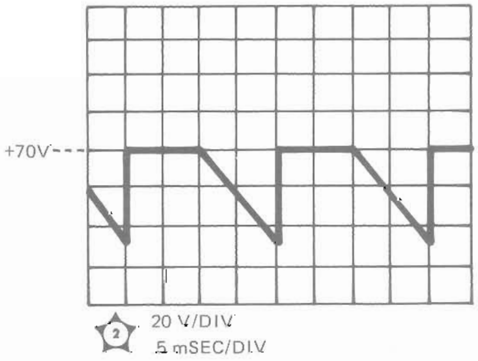
2. Set monitor oscilloscope TIME/DIV and VOLTS/DIV controls as indicated under waveform(s).

3. Connect HP Model 211B Square-wave Generator 50-ohm output to Model 1740A channel A INPUT connector.

4. Adjust square-wave generator output for 6 divisions of signal amplitude (.6 V) at 5 kHz.

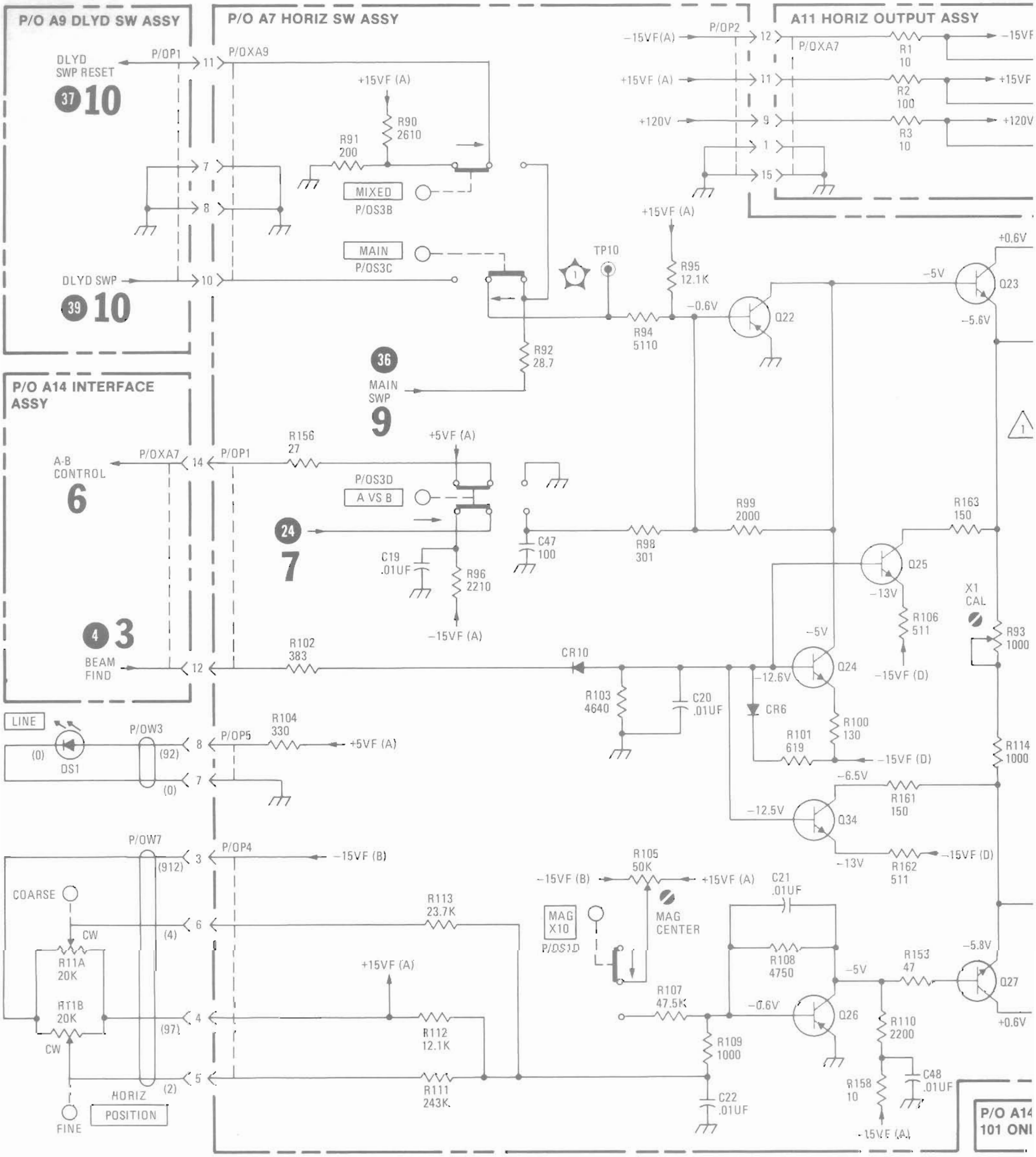


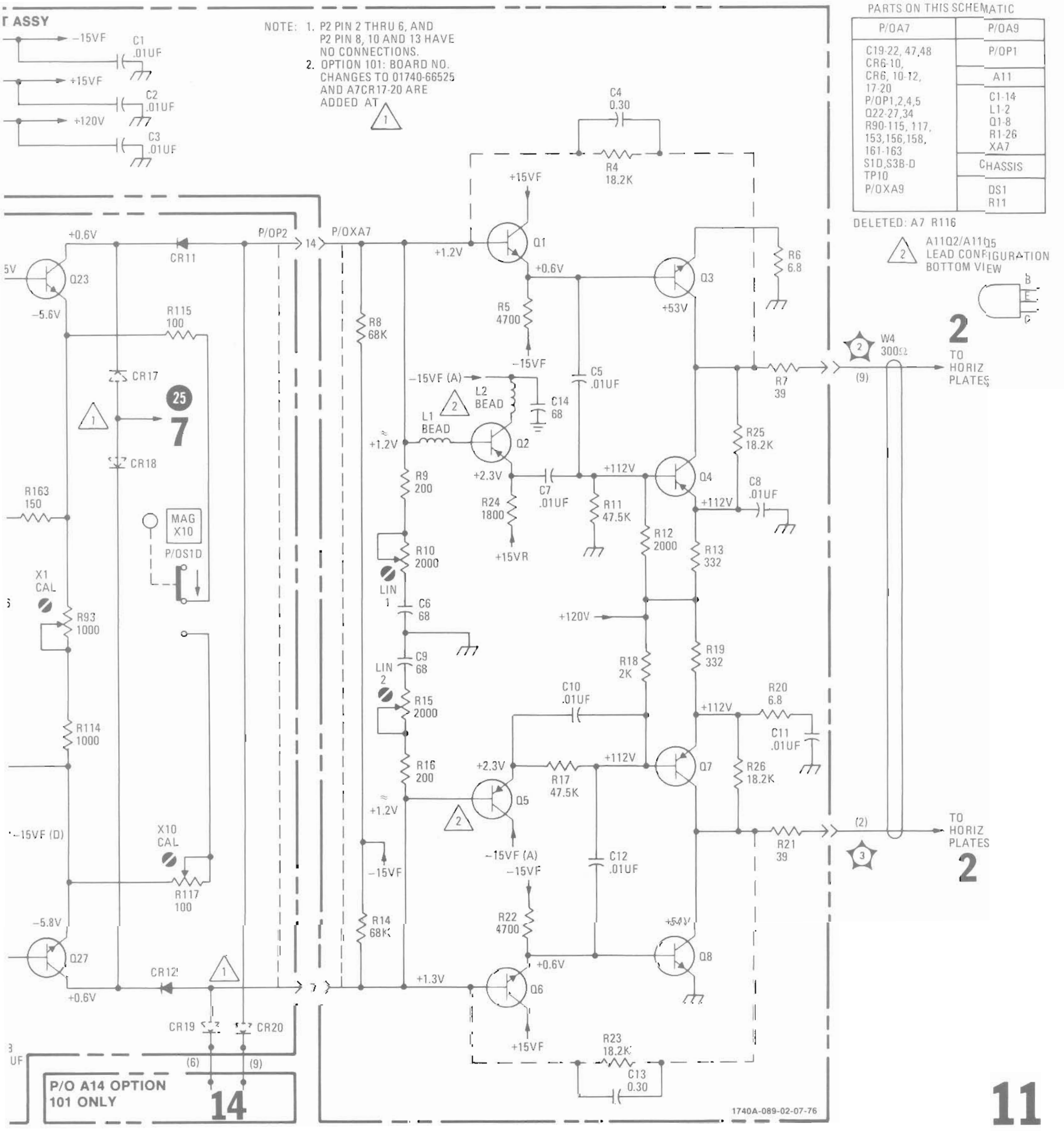




1740A-089-01-10-75

Figure 8-20. Service Information, Horizontal Output Assembly A11 and Horizontal Sweep Assembly A7 (Sheet 1 of 2)


P/O A9 DLYD SW ASSY
DLYD SWP RESET
37 10
DLYD SWP
39 10
P/OP1
P/O A14 INTERFACE ASSY
A-B CONTROL
6
4 3
BEAM FIND
P/OXA7
LINE
DS1
(0)
P/OW3
(92)
(0)
P/OW7
(912)
(4)
(97)
(2)
COARSE
CW
R11A 20K
R11B 20K
CW
FINE
HORIZ POSITION
P/O A7 HORIZ SW ASSY
P/OXA9
+15VF (A)
R90 2610
R91 200
MIXED
P/OS3B
MAIN
P/OS3C
TP10
1
R92 28.7
36
MAIN SWP
9
R156 27
P/OP1
+5VF (A)
P/OS3D
A VS B
24
7
C19 .01UF
R96 2210
-15VF (A)
C47 100
R102 383
R104 330
+5VF (A)
P/OP5
P/OP4
-15VF (B)
R113 23.7K
+15VF (A)
R112 12.1K
R111 243K
MAG X10
P/OS1D
R105 50K
-15VF (B)
+15VF (A)
MAG CENTER
R107 47.5K
R109 1000
C22 .01UF
C21 .01UF
R108 4750
-5V
-0.6V
Q26
R110 2200
R158 10
C48 .01UF
-15VF (A)
R153 47
-5.8V
Q27
+0.6V
P/O A14
101 ONI
P/OP2
-15VF(A)
+15VF (A)
+120V
12
11
9
1
15
A11 HORIZ OUTPUT ASSY
P/OXA7
R1 10
R2 100
R3 10
-15VF
+15VF
+120V
+15VF (A)
R95 12.1K
R94 5110
-0.6V
Q22
-5V
Q23
+0.6V
-5.6V
R99 2000
R98 301
R163 150
Q25
-13V
R106 511
-15VF (D)
X1 CAL
R93 1000
1
CR10
R103 4640
C20 .01UF
-12.6V
-5V
Q24
CR6
R101 619
R100 130
-15VF (D)
R114 1000
-6.5V
-12.5V
Q34
R161 150
-13V
R162 511
-15VF (D)


T ASSY
−15VF
C1
.01UF
+15VF
C2
.01UF
+120V
C3
.01UF
+0.6V
P/OP2
14
P/OXA7
CR11
Q23
−5.6V
R115
100
CR17
1
25
7
CR18
R163
150
MAG
X10
P/OS1D
X1
CAL
R93
1000
R114
1000
−15VF (D)
X10
CAL
R117
100
−5.8V
Q27
CR12
+0.6V
CR19
CR20
(6)
(9)
P/O A14 OPTION
101 ONLY
14
R8
68K
+1.2V
R9
200
R10
2000
LIN
1
C6
68
C9
68
LIN
2
R15
2000
R16
200
+1.2V
−15VF
R14
68K
+1.3V
+15VF
Q1
+1.2V
+0.6V
R5
4700
−15VF
−15VF (A)
L2
BEAD
2
C14
68
L1
BEAD
Q2
+2.3V
R24
1800
+15VR
C7
.01UF
C4
0.30
R4
18.2K
C5
.01UF
+112V
R11
47.5K
Q3
+53V
R6
6.8
Q4
+112V
C8
.01UF
R25
18.2K
R12
2000
R13
332
+120V
R18
2K
R19
332
C10
.01UF
+2.3V
R17
47.5K
+112V
Q5
2
−15VF (A)
−15VF
R22
4700
+0.6V
Q6
+15VF
C12
.01UF
Q7
+112V
R20
6.8
C11
.01UF
R26
18.2K
+54V
Q8
R23
18.2K
C13
0.30
R7
39
R21
39
W4
300Ω
(9)
(2)
2
3
TO
HORIZ
PLATES
2
TO
HORIZ
PLATES
2
B
E
C
1740A-089-02-07-76
11

NOTE: 1. P2 PIN 2 THRU 6, AND P2 PIN 8, 10 AND 13 HAVE NO CONNECTIONS.
2. OPTION 101: BOARD NO. CHANGES TO 01740-66525 AND A7CR17-20 ARE ADDED AT 1

PARTS ON THIS SCHEMATIC

P/OA7	C19-22, 47,48 CR6-10, CR6, 10-12, 17-20 P/OP1,2,4,5 Q22-27,34 R90-115, 117, 153,156,158, 161-163 S1D,S3B-D TP10 P/OXA9
P/OA9	
P/OP1	
A11	C1-14 L1-2 Q1-8 R1-26 XA7
CHASSIS	DS1 R11

DELETED: A7 R116

2 A11Q2/A11Q5 LEAD CONFIGURATION BOTTOM VIEW

Figure 8-20.
Service Information, Horizontal Output Assembly A11 and Horizontal Sweep Assembly A7 (Sheet 2 of 2)

DC VOLTAGE MEASUREMENT CONDITIONS
SCHEMATIC 12

1. Set front panel controls in accordance with initial control settings in Section V, except as follows:

Sweep mode	A VS B
BEAM INTENSITY	barely visible spot
Spot centered on CRT	

2. All voltages are referenced to chassis ground. All indications are nominal and ±5% variation from those indicated should be considered normal.

WAVEFORM MEASUREMENT CONDITIONS
SCHEMATIC 12

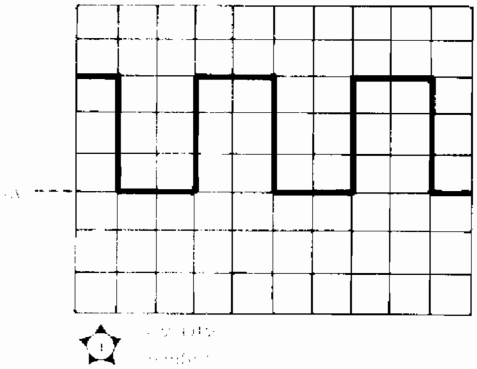
1. Set front panel controls in accordance with initial control settings in Section V, except as follows:

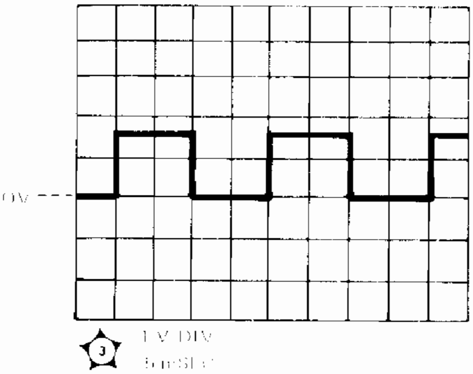
Coupling (channel A)	50Ω
TRIGGER LEVEL (main)	stable display

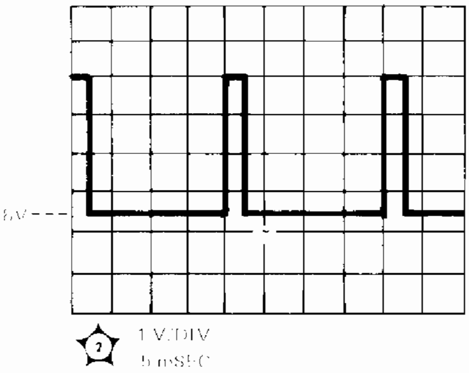
2. Set monitor oscilloscope TIME/DIV and VOLTS/DIV controls as indicated under waveform(s).

3. Connect HP Model 211B Square-wave Generator 50-ohm output to Model 1740A channel A INPUT connector.

4. Adjust square wave generator output for 6 divisions of signal amplitude (.6 V) at 5 kHz.

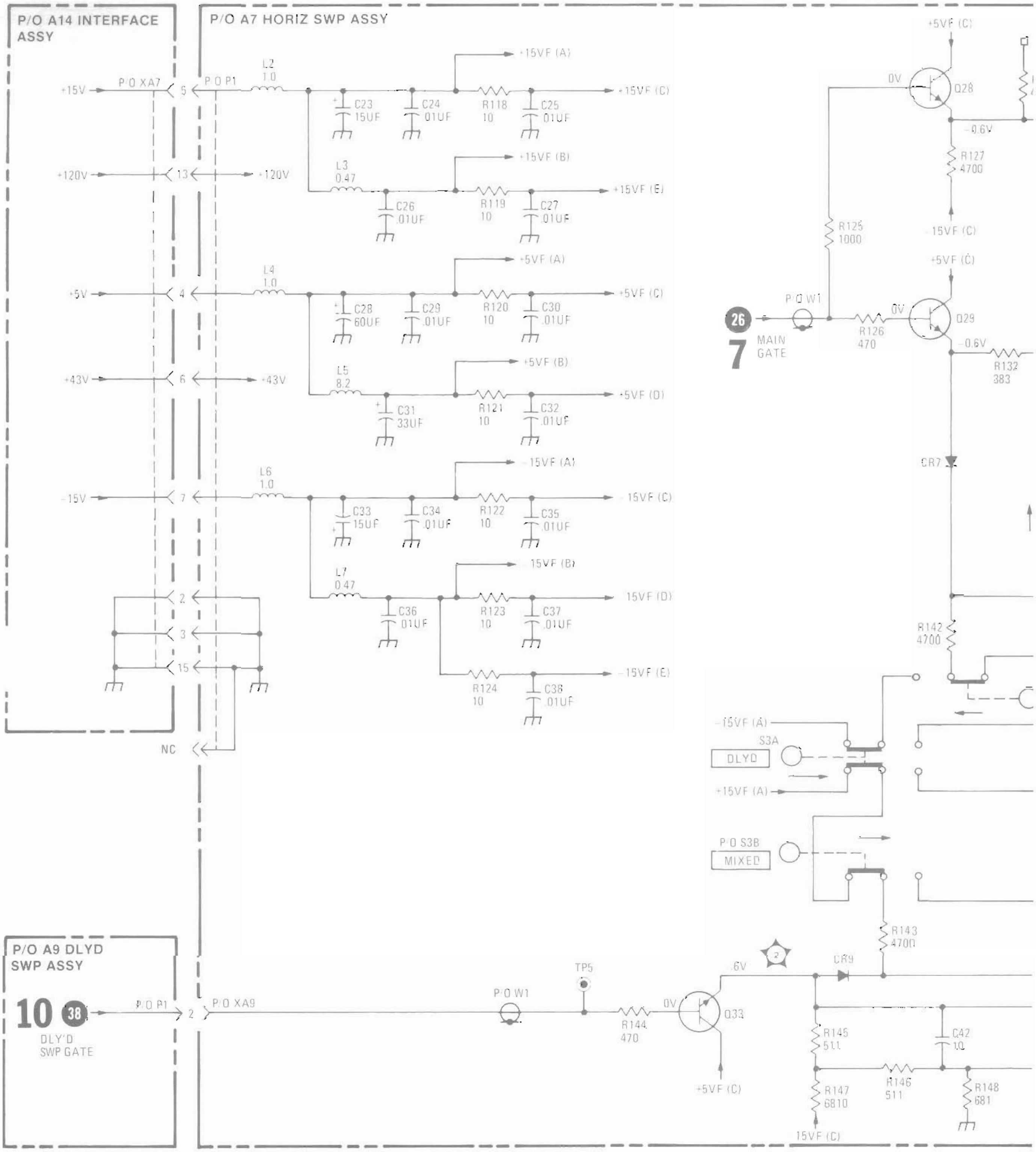


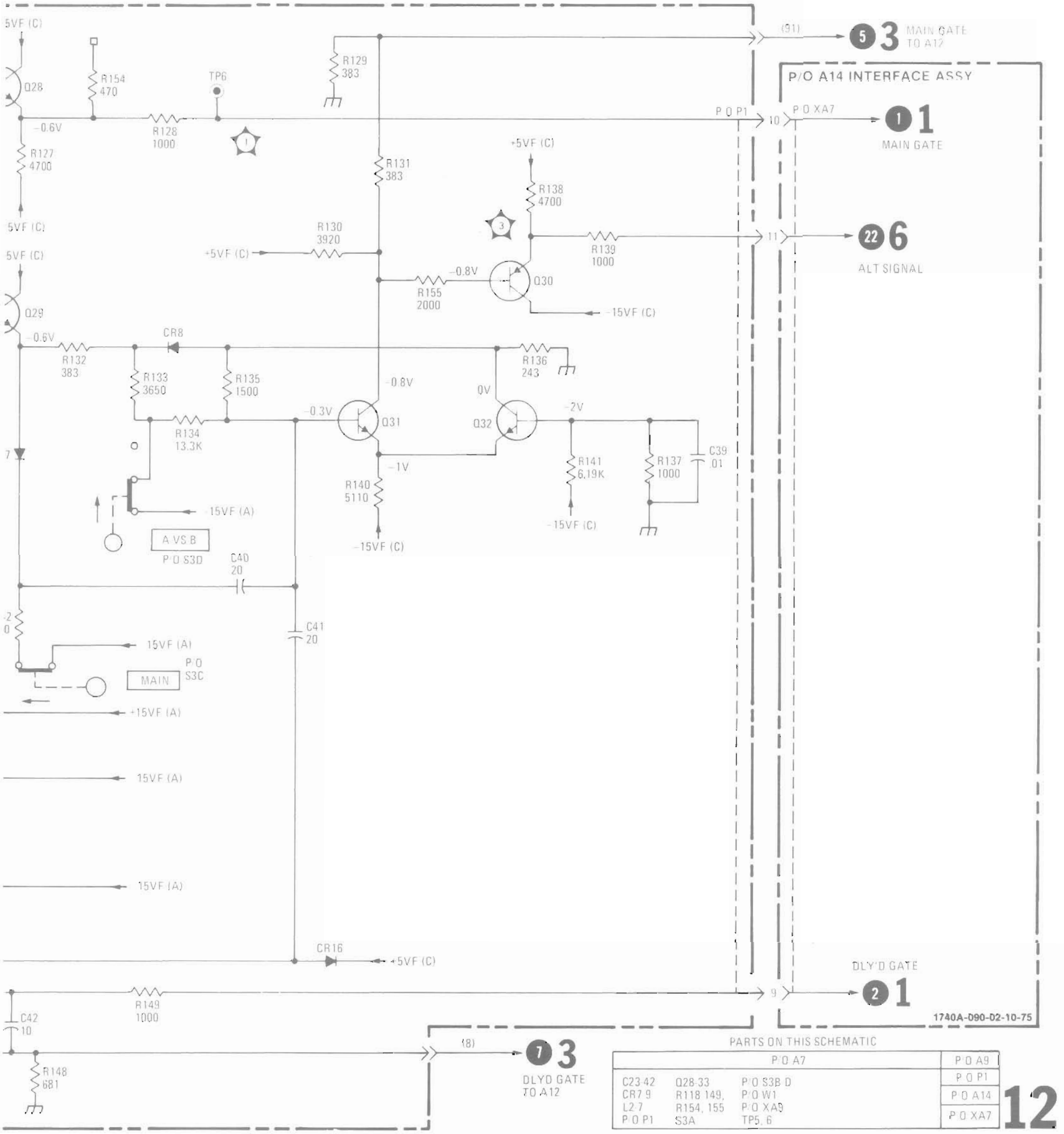




1740A-090 01-10-75

Figure 8-21. Service Information, Gate Schmitt, P/O Assembly A7 (Sheet 1 of 2)

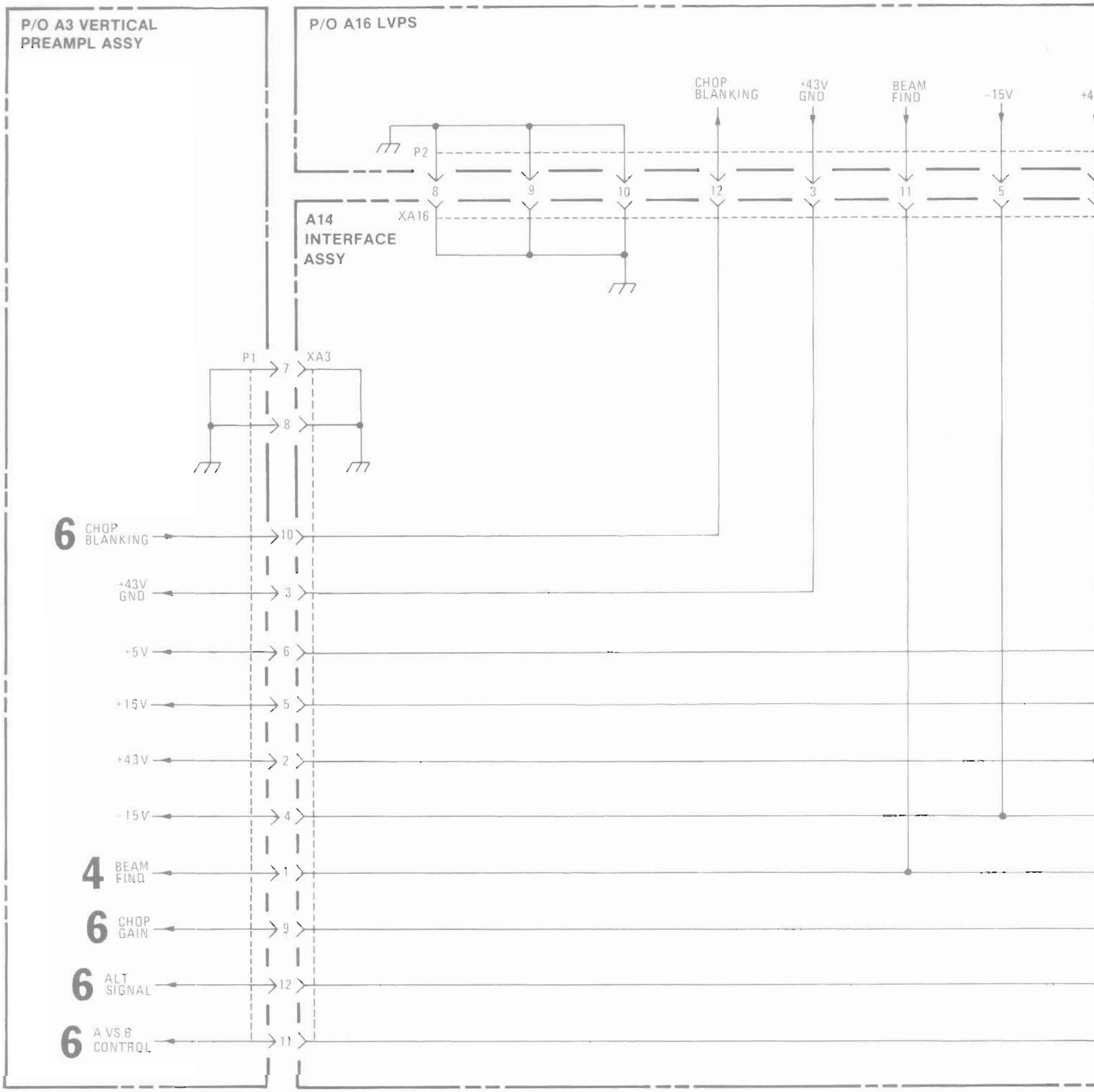

P/O A14 INTERFACE ASSY
P/O A7 HORIZ SWP ASSY
P/O XA7
P/O P1
+15V
+120V
+5V
+43V
-15V
NC
L2 1.0
L3 0.47
L4 1.0
L5 8.2
L6 1.0
L7 0.47
C23 15UF
C24 .01UF
R118 10
C25 .01UF
+15VF (A)
+15VF (C)
+15VF (B)
+15VF (E)
C26 .01UF
R119 10
C27 .01UF
+5VF (A)
+5VF (C)
C28 60UF
C29 .01UF
R120 10
C30 .01UF
+5VF (B)
+5VF (D)
C31 33UF
R121 10
C32 .01UF
-15VF (A)
-15VF (C)
C33 15UF
C34 .01UF
R122 10
C35 .01UF
-15VF (B)
-15VF (D)
C36 .01UF
R123 10
C37 .01UF
-15VF (E)
R124 10
C38 .01UF
Q28
0V
-0.6V
R127 4700
R125 1000
P/O W1
26
7
MAIN GATE
R126 470
Q29
R132 383
CR7
R142 4700
S3A
DLYD
P/O S3B
MIXED
R143 4700
P/O A9 DLYD SWP ASSY
10
38
DLY'D SWP GATE
P/O XA9
TP5
R144 470
Q33
6V
CR9
2
R145 511
C42 10
R147 6810
R146 511
R148 681

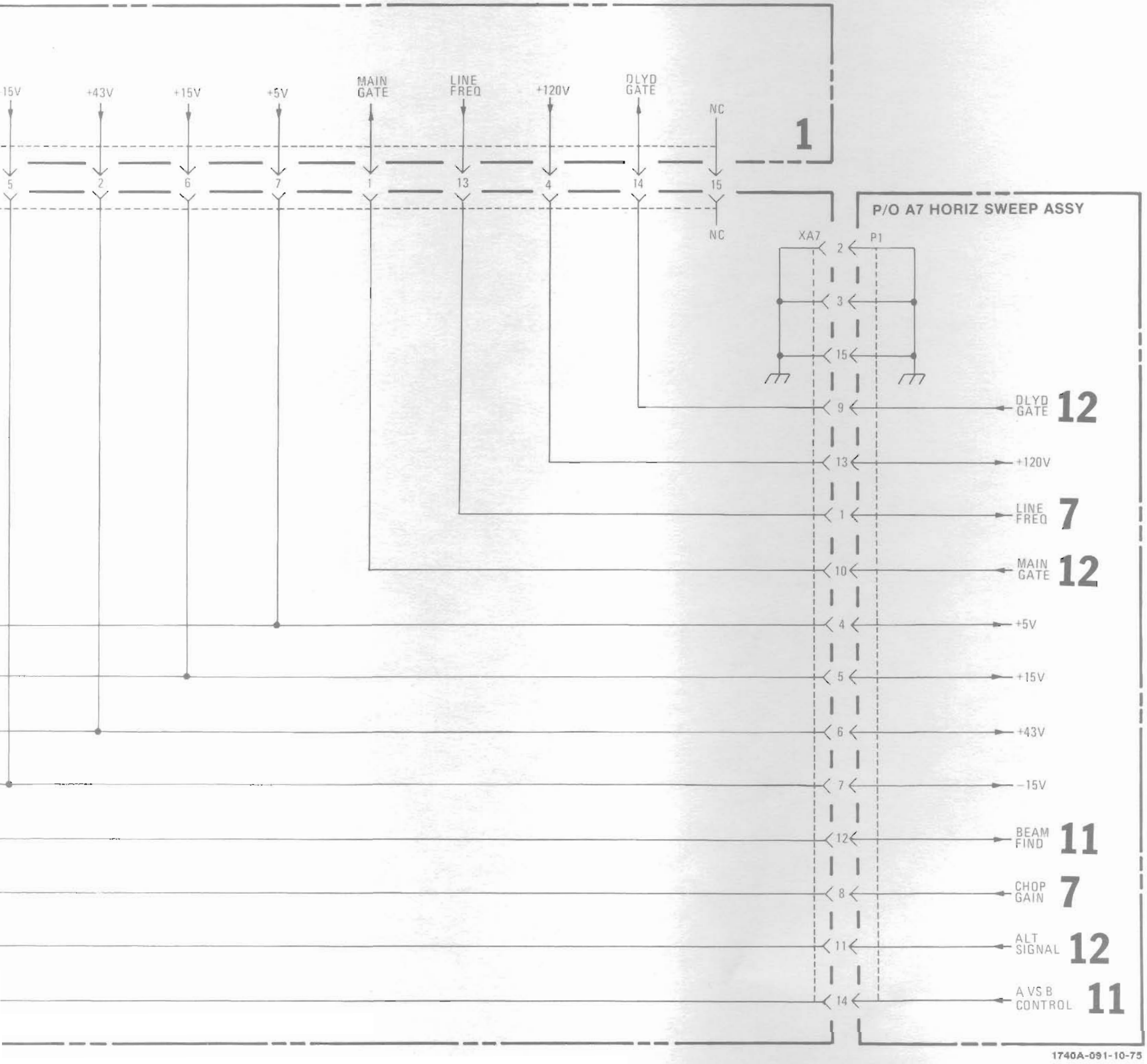

5VF (C)
Q28
R154
470
TP6
R129
383
(31)
5 3
MAIN GATE
TO A12
P/O A14 INTERFACE ASSY
-0.6V
R128
1000
R127
4700
1
P O P1
10
P O XA7
1 1
MAIN GATE
+5VF (C)
R131
383
R138
4700
5VF (C)
3
R130
3920
+5VF (C)
11
R139
1000
22 6
ALT SIGNAL
5VF (C)
-0.8V
R155
2000
Q30
-15VF (C)
Q29
-0.6V
CR8
R132
383
R136
243
R133
3650
R135
1500
-0.8V
0V
-0.3V
Q31
Q32
-2V
R134
13.3K
R141
6.19K
R137
1000
C39
.01
-1V
R140
5110
-15VF (A)
-15VF (C)
A VS B
P/O S3D
-15VF (C)
C40
20
C41
20
15VF (A)
P/O
S3C
MAIN
+15VF (A)
15VF (A)
15VF (A)
CR16
+5VF (C)
DLY'D GATE
9
2 1
R149
1000
C42
10
1740A-090-02-10-75
(8)
7 3
DLYD GATE
TO A12
R148
681
12

PARTS ON THIS SCHEMATIC

P/O A7			P/O A9
C23-42	Q28-33	P/O S3B-D	P/O P1
CR7-9	R118-149,	P/O W1	P/O A14
L2-7	R154, 155	P/O XA9	P/O XA7
P/O P1	S3A	TP5, 6	

Figure 8-21.
Service Information, Gate Schmitt, P/O Assembly A7 (Sheet 2 of 2)


P/O A3 VERTICAL PREAMPL ASSY
P/O A16 LVPS
CHOP BLANKING
+43V GND
BEAM FIND
-15V
P2
8
9
10
12
3
11
5
XA16
A14 INTERFACE ASSY
P1
XA3
7
8
6 CHOP BLANKING
10
+43V GND
3
+5V
6
+15V
5
+43V
2
-15V
4
4 BEAM FIND
1
6 CHOP GAIN
9
6 ALT SIGNAL
12
6 A VS B CONTROL
11

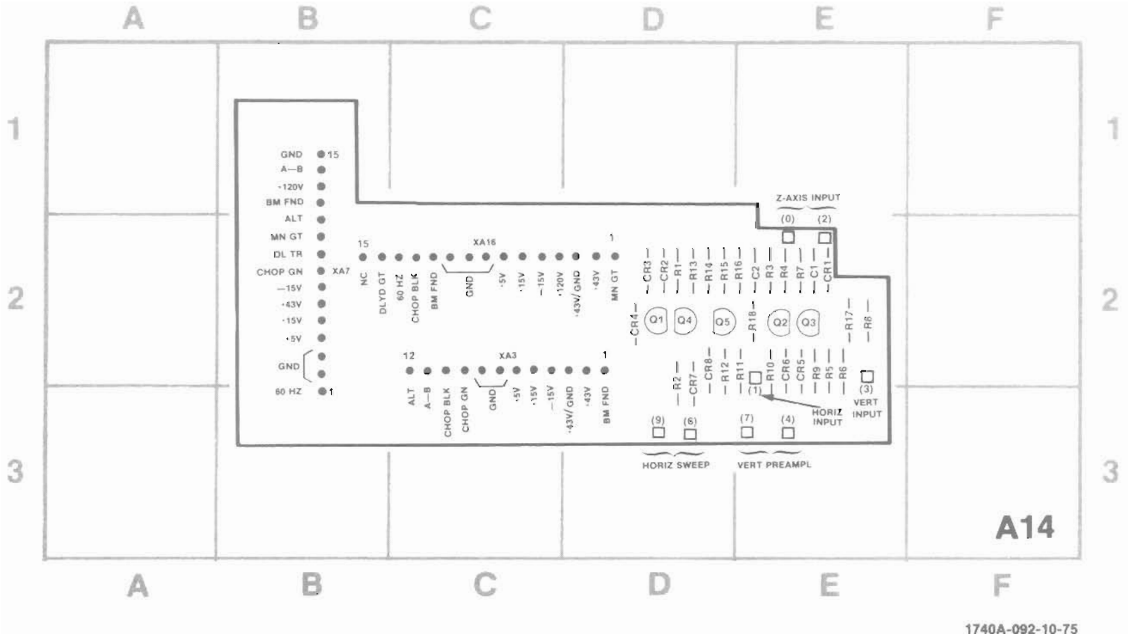

15V
+43V
+15V
+5V
MAIN GATE
LINE FREQ
+120V
DLYD GATE
NC
1
5
2
6
7
1
13
4
14
15
NC
P/O A7 HORIZ SWEEP ASSY
XA7
P1
2
3
15
9
DLYD GATE 12
13
+120V
1
LINE FREQ 7
10
MAIN GATE 12
4
+5V
5
+15V
6
+43V
7
−15V
12
BEAM FIND 11
8
CHOP GAIN 7
11
ALT SIGNAL 12
14
A VS B CONTROL 11
1740A-091-10-75

PARTS ON THIS SCHEMATIC

P/O A3	P/O A7	A14	P/O A16
P1	P1	XA3 XA7 XA16	P2

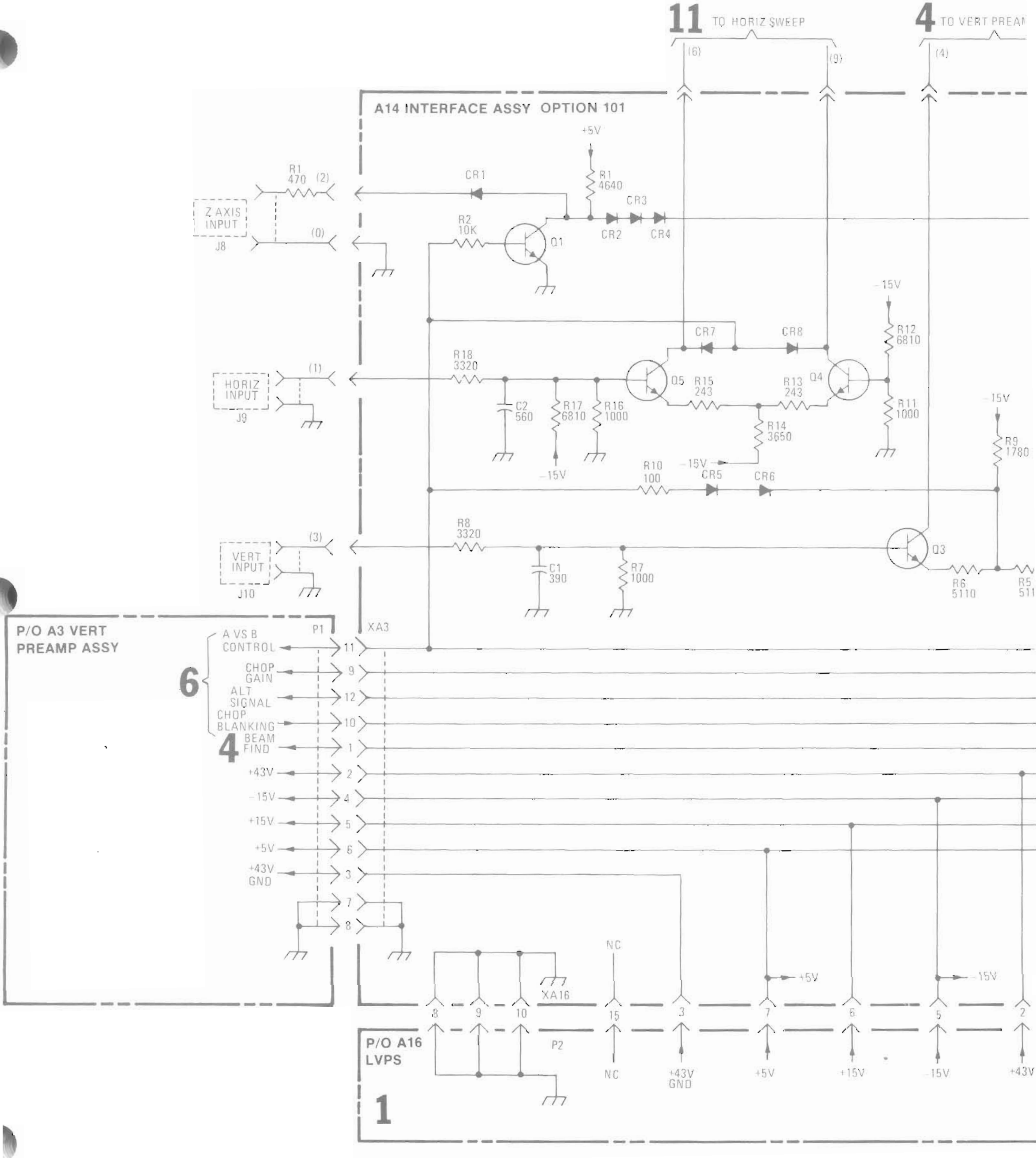
13

Figure 8-22.
Service Information, Interface Assembly A14


A
B
C
D
E
F
1
2
3
GND
A—B
-120V
BM FND
ALT
MN GT
DL TR
CHOP GN
—15V
·43V
·15V
·5V
GND
60 HZ
15
1
XA7
15
XA16
1
NC
DLYD GT
60 HZ
CHOP BLK
BM FND
GND
·5V
·15V
—15V
·120V
·43V/GND
·43V
MN GT
12
XA3
1
ALT
A—B
CHOP BLK
CHOP GN
GND
·5V
·15V
—15V
·43V/GND
·43V
BM FND
CR3
CR2
R1
R13
R14
R15
R16
C2
R3
R4
R7
C1
CR1
CR4
Q1
Q4
Q5
R18
Q2
Q3
R17
R8
R2
CR7
CR8
R12
R11
R10
CR6
CR5
R9
R5
R6
Z-AXIS INPUT
(0)
(2)
(1)
(3)
HORIZ INPUT
VERT INPUT
(9)
(6)
(7)
(4)
HORIZ SWEEP
VERT PREAMPL
A14
1740A-092-10-75

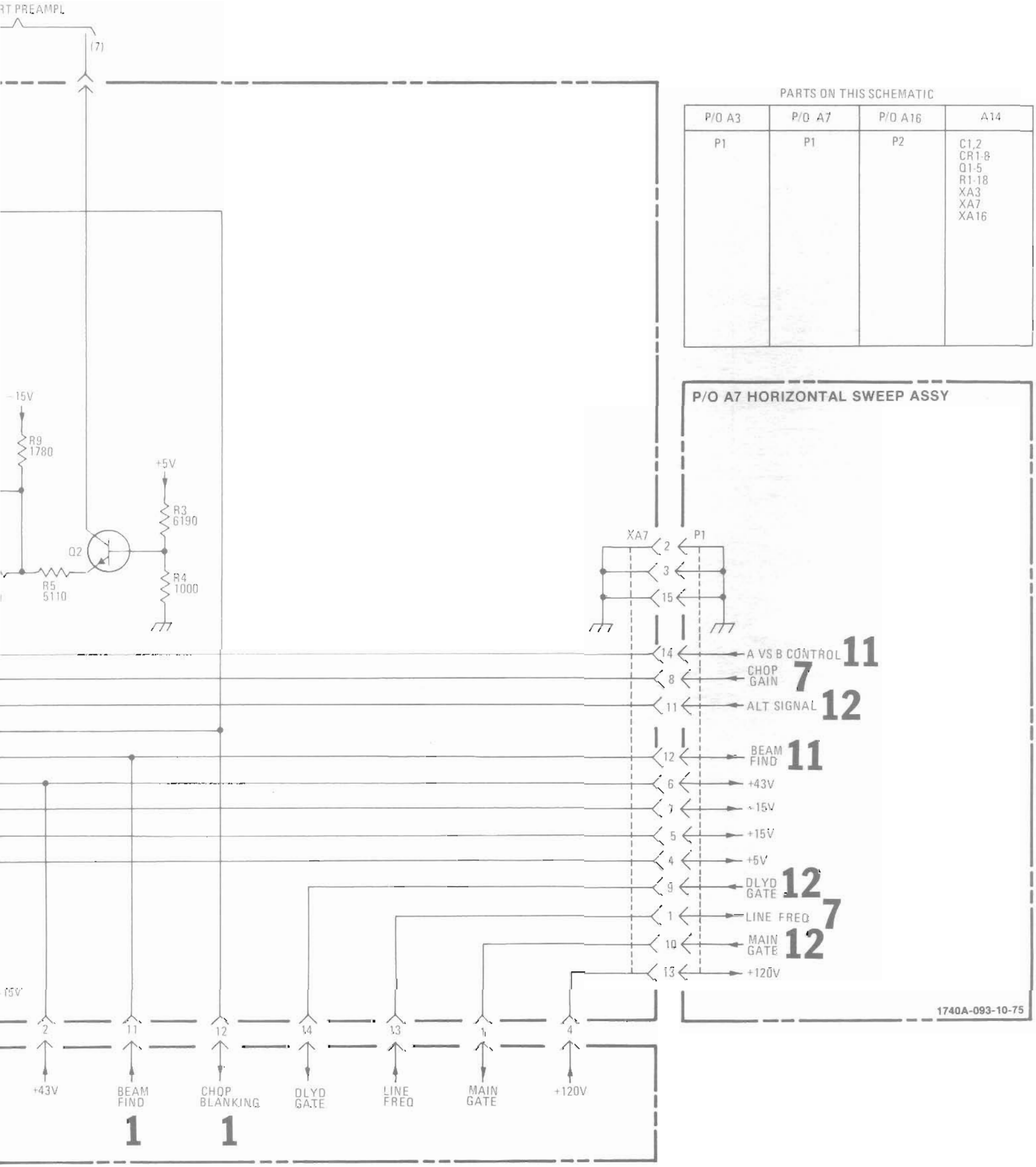
REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC
C1	E-2	CR5	E-2	Q3	E-2	R4	E-2	R10	E-2	R16	E-2
C2	E-2	CR7	D-3	Q4	D-2	R5	E-2	R11	E-2	R17	E-2
CR1	E-2	CR8	D-2	Q5	D-2	R6	E-2	R12	D-2	R18	E-2
CR2	D-2	CR8	D-2	R1	D-2	R7	E-2	R13	D-2	XA3	C-2
CR3	D-2	Q1	D-2	R2	D-3	R8	E-2	R14	D-2	XA7	B-2
CR4	D-2	Q2	E-2	R3	E-2	R9	E-2	R15	D-2	XA16	C-2

Figure 8-23. Service Information, Option 101 Interface Assembly A14 (Sheet 1 of 2)


11 TO HORIZ SWEEP
(6)
(9)
4 TO VERT PREAM
(4)
A14 INTERFACE ASSY OPTION 101
+5V
R1
470
(2)
Z AXIS INPUT
J8
(0)
CR1
R1
4640
CR3
CR2
CR4
R2
10K
Q1
-15V
R12
6810
CR7
CR8
R18
3320
(1)
HORIZ INPUT
J9
Q5
R15
243
R13
243
Q4
C2
560
R17
6810
R16
1000
R14
3650
R11
1000
-15V
R9
1780
-15V
R10
100
-15V
CR5
CR6
R8
3320
(3)
VERT INPUT
J10
Q3
C1
390
R7
1000
R6
5110
R5
511
P/O A3 VERT PREAMP ASSY
P1
XA3
6
A VS B CONTROL
11
CHOP GAIN
9
ALT SIGNAL
12
CHOP BLANKING
10
4
BEAM FIND
1
+43V
2
-15V
4
+15V
5
+5V
6
+43V GND
3
7
8
NC
+5V
-15V
XA16
8
9
10
15
3
7
6
5
2
P/O A16 LVPS
P2
NC
+43V GND
+5V
+15V
-15V
+43V
1

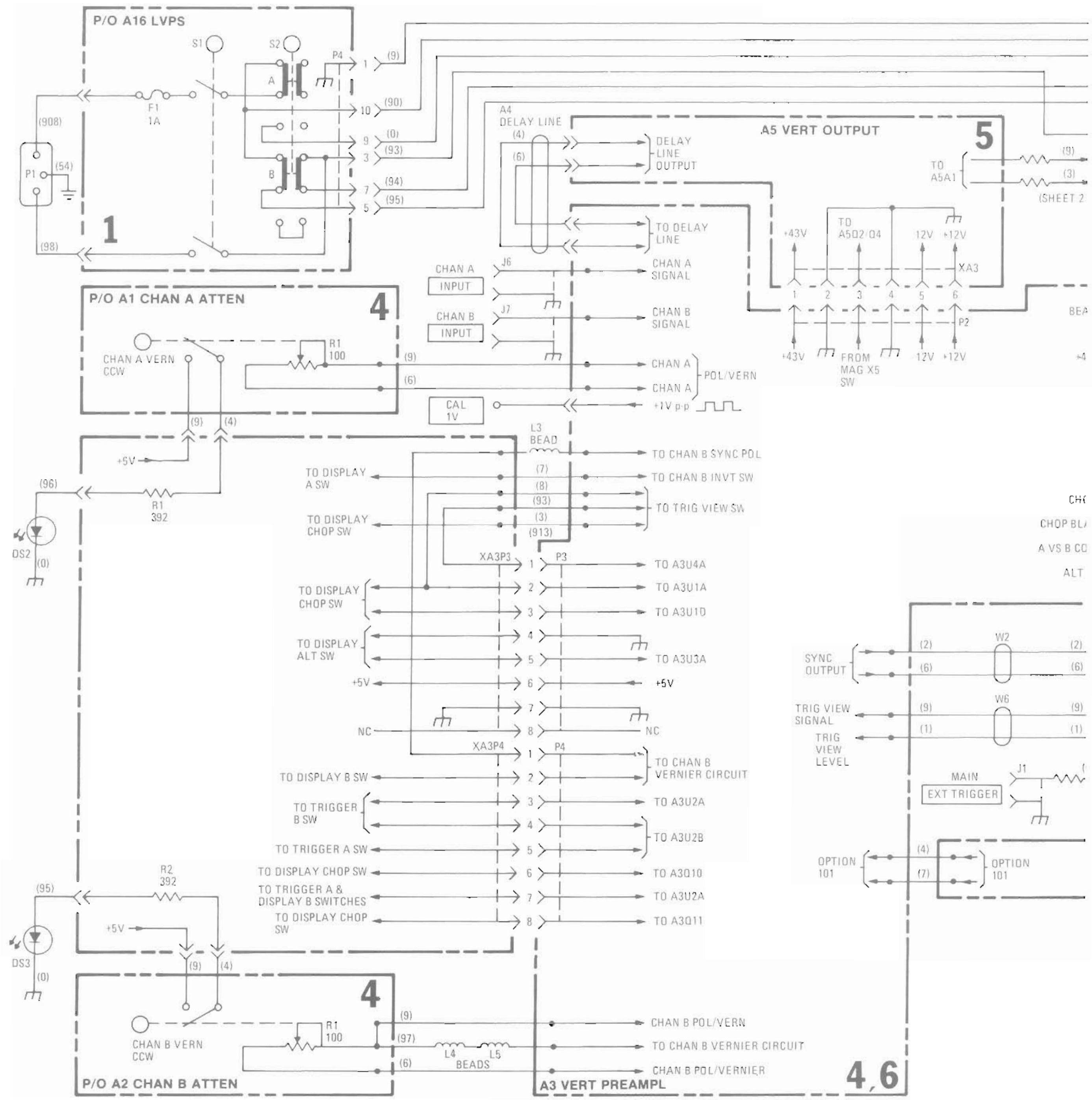
PARTS ON THIS SCHEMATIC

P/O A3	P/O A7	P/O A16	A14
P1	P1	P2	C1,2 CR1-8 Q1-5 R1-18 XA3 XA7 XA16


RT PREAMPL
(7)
-15V
R9 1780
+5V
R3 6190
Q2
R5 5110
R4 1000
P/O A7 HORIZONTAL SWEEP ASSY
XA7
P1
2
3
15
14
A VS B CONTROL
11
8
CHOP GAIN
7
11
ALT SIGNAL
12
12
BEAM FIND
11
6
+43V
7
-15V
5
+15V
4
+5V
9
DLYD GATE
12
1
LINE FREQ
7
10
MAIN GATE
12
13
+120V
1740A-093-10-75
-15V
2
11
12
14
13
1
4
+43V
BEAM FIND
1
CHOP BLANKING
1
DLYD GATE
LINE FREQ
MAIN GATE
+120V

14

Figure 8-23.
Information, Option 101 Interface Assembly A14 (Sheet 2 of 2)


P/O A16 LVPS
S1
S2
P4
A
B
F1
1A
(908)
P1
(54)
(98)
1
(9)
(90)
(0)
(93)
(94)
(95)
1
10
9
3
7
5
A4
DELAY LINE
(4)
(6)
A5 VERT OUTPUT
5
DELAY LINE OUTPUT
TO DELAY LINE
TO A5A1
(9)
(3)
(SHEET 2
+43V
TO A5Q2/Q4
12V
+12V
XA3
P2
1 2 3 4 5 6
+43V
FROM MAG X5 SW
12V
+12V
BEA
+4
P/O A1 CHAN A ATTEN
4
CHAN A VERN CCW
R1 100
(9)
(6)
CHAN A INPUT
J6
CHAN B INPUT
J7
CHAN A SIGNAL
CHAN B SIGNAL
CHAN A
CHAN A
POL/VERN
CAL 1V
+1V p-p
(9)
(4)
+5V
(96)
R1 392
DS2
(0)
L3 BEAD
TO CHAN B SYNC POL
TO DISPLAY A SW
(7)
TO CHAN B INVT SW
(8)
(93)
TO TRIG VIEW SW
TO DISPLAY CHOP SW
(3)
(913)
XA3P3
P3
1 TO A3U4A
2 TO A3U1A
TO DISPLAY CHOP SW
3 TO A3U1D
4
TO DISPLAY ALT SW
5 TO A3U3A
+5V
6 +5V
7
NC
8 NC
XA3P4
P4
1 TO CHAN B VERNIER CIRCUIT
TO DISPLAY B SW
2
TO TRIGGER B SW
3 TO A3U2A
4 TO A3U2B
TO TRIGGER A SW
5
TO DISPLAY CHOP SW
6 TO A3Q10
TO TRIGGER A & DISPLAY B SWITCHES
7 TO A3U2A
TO DISPLAY CHOP SW
8 TO A3Q11
CH(
CHOP BL/
A VS B CO
ALT
SYNC OUTPUT
W2
(2)
(6)
(2)
(6)
TRIG VIEW SIGNAL
TRIG VIEW LEVEL
W6
(9)
(1)
(9)
(1)
MAIN EXT TRIGGER
J1
OPTION 101
(4)
(7)
OPTION 101
(95)
R2 392
+5V
DS3
(0)
(9)
(4)
P/O A2 CHAN B ATTEN
4
CHAN B VERN CCW
R1 100
(9)
(97)
(6)
L4 L5 BEADS
CHAN B POL/VERN
TO CHAN B VERNIER CIRCUIT
CHAN B POL/VERNIER
A3 VERT PREAMPL
4,6

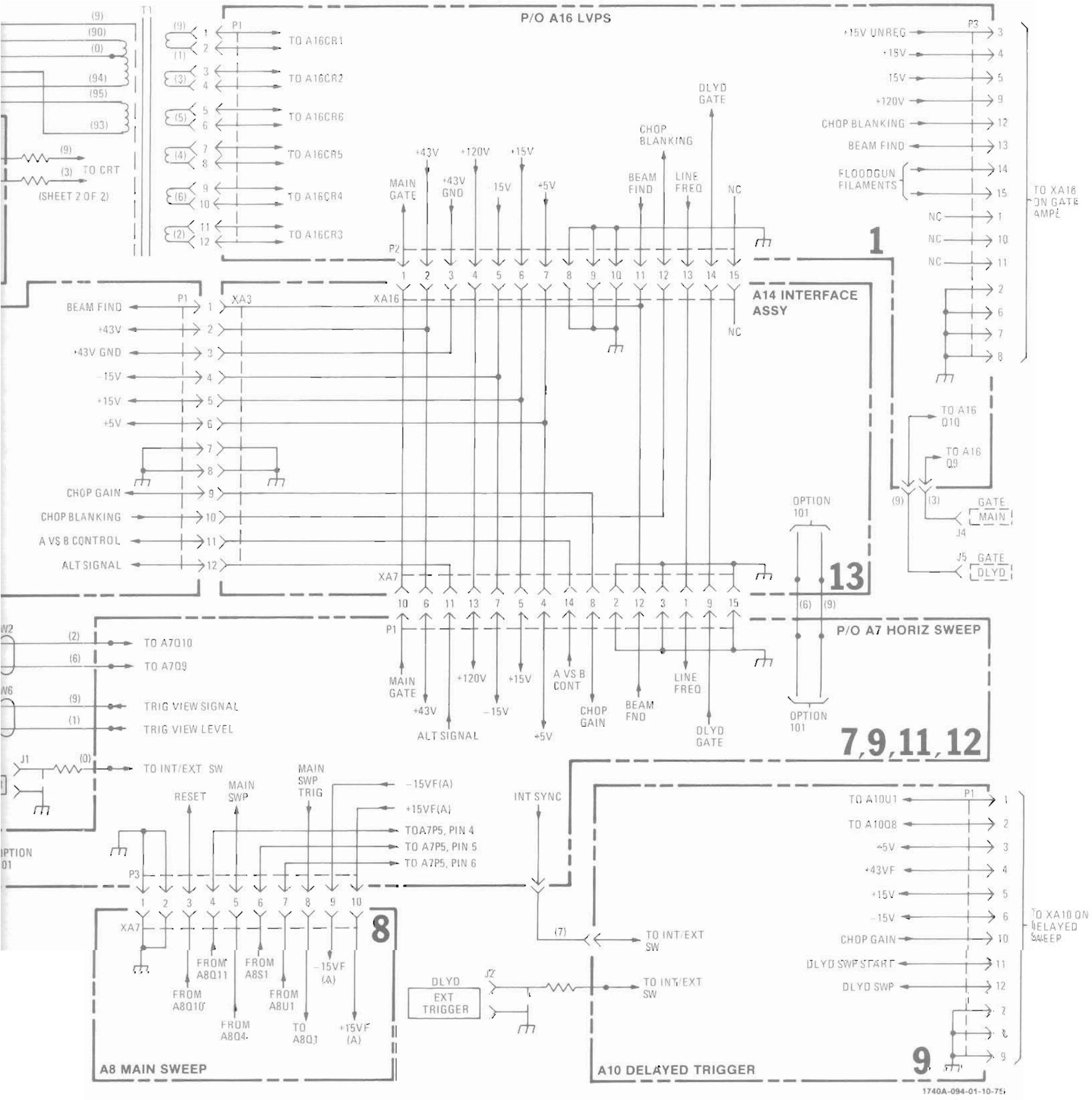
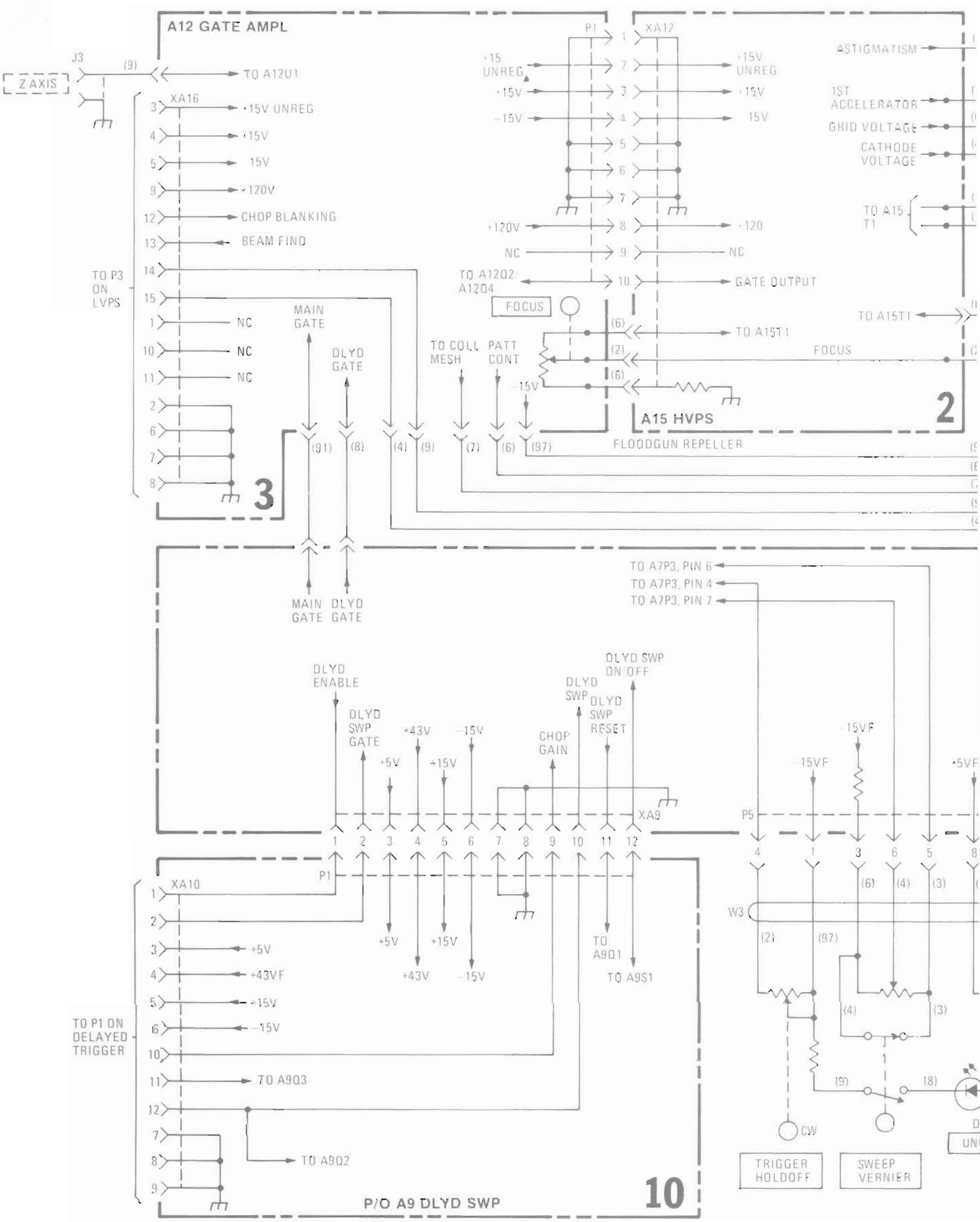

P/O A16 LVPS
T1
(9)
(90)
(0)
(94)
(95)
(93)
(9)
(3) TO CRT
(SHEET 2 OF 2)
P1
(1)
(3)
(5)
(4)
(6)
(2)
TO A16CR1
TO A16CR2
TO A16CR6
TO A16CR5
TO A16CR4
TO A16CR3
DLYD GATE
CHOP BLANKING
BEAM FIND
LINE FREQ
NC
+43V
+120V
+15V
MAIN GATE
+43V GND
-15V
+5V
P2
+15V UNREG
+15V
-15V
+120V
CHOP BLANKING
BEAM FIND
FLOODGUN FILAMENTS
NC
NC
NC
P3
TO XA16 ON GATE AMPL
1
XA16
A14 INTERFACE ASSY
NC
XA3
BEAM FIND
+43V
+43V GND
-15V
+15V
+5V
CHOP GAIN
CHOP BLANKING
A VS B CONTROL
ALT SIGNAL
TO A16 Q10
TO A16 Q9
(9)
(3)
GATE MAIN
J4
J5
GATE DLYD
OPTION 101
XA7
13
(6)
(9)
P1
P/O A7 HORIZ SWEEP
W2
(2)
(6)
TO A7Q10
TO A7Q9
W6
(9)
(1)
TRIG VIEW SIGNAL
TRIG VIEW LEVEL
J1
(0)
TO INT/EXT SW
MAIN GATE
+43V
ALT SIGNAL
+120V
-15V
+15V
+5V
A VS B CONT
CHOP GAIN
BEAM FND
LINE FREQ
DLYD GATE
OPTION 101
7,9,11,12
RESET
MAIN SWP
MAIN SWP TRIG
-15VF(A)
+15VF(A)
TO A7P5, PIN 4
TO A7P5, PIN 5
TO A7P5, PIN 6
INT SYNC
OPTION 101
P3
XA7
8
FROM A8Q11
FROM A8S1
-15VF (A)
FROM A8Q10
FROM A8U1
FROM A8Q4
TO A8Q1
+15VF (A)
A8 MAIN SWEEP
(7)
TO INT/EXT SW
DLYD EXT TRIGGER
J2
TO INT/EXT SW
P1
TO A10U1
TO A10Q8
+5V
+43VF
+15V
-15V
CHOP GAIN
DLYD SWP START
DLYD SWP
TO XA10 ON DELAYED SWEEP
9
A10 DELAYED TRIGGER
1740A-094-01-10-75

Figure 8-24. Interconnection Diagram (Sheet 1 of 2)


A12 GATE AMPL
J3
Z AXIS
(9)
TO A12U1
XA16
+15V UNREG
+15V
-15V
+120V
CHOP BLANKING
BEAM FIND
TO P3 ON LVPS
NC
NC
NC
MAIN GATE
DLYD GATE
3
P1
XA12
+15 UNREG
+15V
-15V
+120V
NC
TO A12Q2/ A12Q4
+15V UNREG
+15V
-15V
+120
NC
GATE OUTPUT
FOCUS
TO A15T1
FOCUS
TO COLL MESH
PATT CONT
-15V
A15 HVPS
2
FLOODGUN REPELLER
(91)
(8)
(4)
(9)
(7)
(6)
(97)
ASTIGMATISM
1ST ACCELERATOR
GRID VOLTAGE
CATHODE VOLTAGE
TO A15 T1
TO A15T1
MAIN GATE
DLYD GATE
TO A7P3, PIN 6
TO A7P3, PIN 4
TO A7P3, PIN 7
DLYD ENABLE
DLYD SWP GATE
+5V
+43V
+15V
-15V
CHOP GAIN
DLYD SWP
DLYD SWP RESET
DLYD SWP ON/OFF
XA9
P5
-15VF
+15VF
+5VF
P1
XA10
+5V
+43VF
+15V
-15V
TO P1 ON DELAYED TRIGGER
TO A9Q3
TO A9Q2
+5V
+43V
+15V
-15V
TO A9Q1
TO A9S1
W3
(2)
(97)
(6)
(4)
(3)
(4)
(3)
(9)
(8)
CW
TRIGGER HOLDOFF
SWEEP VERNIER
P/O A9 DLYD SWP
10

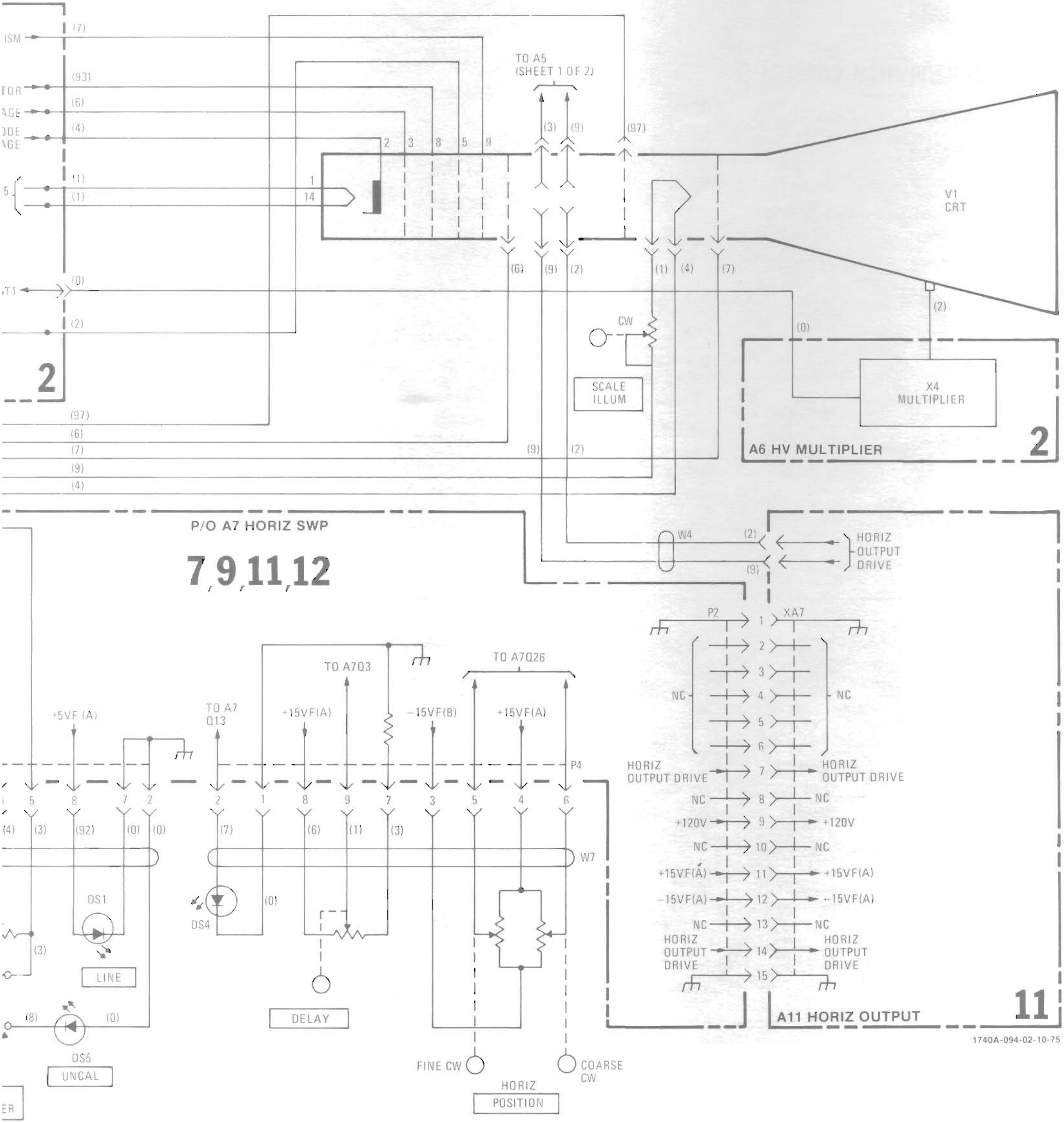

TO A5
(SHEET 1 OF 2)
V1
CRT
X4
MULTIPLIER
A6 HV MULTIPLIER
2
2
SCALE
ILLUM
CW
P/O A7 HORIZ SWP
7, 9, 11, 12
W4
HORIZ
OUTPUT
DRIVE
P2
XA7
NC
NC
HORIZ
OUTPUT DRIVE
HORIZ
OUTPUT DRIVE
+120V
+120V
+15VF(A)
+15VF(A)
−15VF(A)
−15VF(A)
HORIZ
OUTPUT
DRIVE
A11 HORIZ OUTPUT
11
TO A7Q3
TO A7Q26
+5VF (A)
TO A7
Q13
+15VF(A)
−15VF(B)
+15VF(A)
P4
W7
DS1
LINE
DS4
DELAY
DS5
UNCAL
FINE CW
COARSE
CW
HORIZ
POSITION
1740A-094-02-10-75

Figure 8-24.
Interconnection Diagram (Sheet 2 of 2)